City of New Orleans

Broadband – the World's Newest Public Utility

Making the Case for Public Sector Involvement in Expanding Broadband Access

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December 9, 2014

Acknowledgments

This report was prepared for the City of New Orleans under the auspices of the US Department of Housing and Urban Development's Strong Cities, Strong Communities (SC2) Fellowship program. During my two-year fellowship, I worked with staff in the City's Department of Information Technology and Innovation to develop a long-term Broadband Master Plan for the City. Pursuant to that project, I conducted research into the importance of broadband, reasons why people lack broadband access, and possible strategies to help bring broadband to people who currently do not have it.

This report, along with the companion report, "Broadband Around the World: Best Practices and Lessons Learned from Other Jurisdictions," documents the research findings.

I would like to thank my colleagues at the City of New Orleans for their assistance during this process. The people who selflessly shared relevant information and willingly served as sounding boards for ideas are too numerous to name.

I also want to thank the SC2 Fellowship Management team for their assistance in framing the research and for keeping me on task to completion.

Sincerely,
Jennifer

Foreword

As of August 29, 2013, in one second on the internet, there were approximately 200 Reddit votes casted, 500 Instagram photos uploaded, 900 Tumblr posts posted, 1,050 Skype calls connected, 5,000 tweets tweeted, 10,000 files uploaded to Dropbox, 30,000 Google searches, 55,000 YouTube videos viewed and Facebook likes, and multiple billions of emails written and sent.[1] Undoubtedly, these numbers are horribly out of date as you read this document.

In 2000, Skype, Facebook, YouTube, Reddit, Twitter, Tumblr, Dropbox, and Instagram did not exist. For much of the early 1990s, only 130 websites existed, email accounts were rare because users had to pay an internet service provider (ISP) for an account, and Google did not exist. In 1980, there was no publicly available internet.[2]

Since its creation by Sir Tim Berners-Lee in 1989,[3] the world wide web, the millions of websites it hosts and the email, instant messaging, file sharing, internet phone calling, and other services it provides via the internet (of which the previous examples are only a tiny fraction), have become part of life for billions of people worldwide. In 2013, there were approximately 2.7B internet users worldwide; about 25% of these people had access to fixed (or wireline) broadband.[4]

The internet enables people to perform their jobs faster and better, to connect to friends, family, and new contacts, and to invent products to transform life in the 21st century. For billions of people, the new ways of sharing information are as integral to their lives as the air they breathe.

Yet, across the world, and in New Orleans, the lack of internet access or the lack of digital literacy skills excludes many people from utilizing this essential tool of modern life. Such people already experience exclusion from economic, social, and cultural activities considered the societal norm due to factors like poverty, unemployment, depressed housing markets, discrimination, illiteracy, poor health, and disability. This reality often limits their access to financial and human capital. Now, their digital deprivation further exacerbates long-standing exclusion[5]. These people are slipping further behind in virtually all areas of life - economically, politically, educationally, and socially, etc.

This report documents New Orleans' need for better broadband and the need for low income New Orleanians to adopt broadband. It also documents the City's need for a comprehensive Broadband Master Plan to provide strategies to help meet these goals. Sections of the report:

- Describe people's growing dependence on broadband to function in the modern world
- Define and describe available broadband technologies
- List existing broadband internet options in New Orleans
- Summarize previous efforts to expand broadband access in New Orleans
- Define the various components of broadband access and adoption
- Describe differential adoption rates by poor and minority people, the "digital divide"
- Explain root and underlying causes of these differential adoption rates
- Highlight the need for government involvement to address this situation
- Discuss challenges to increased public sector involvement in broadband planning and provision

[1] One Second on the Internet website: http://onesecond.designly.com/
[2] One Second on the Internet website: http://onesecond.designly.com/
[3] Susannah Fox and Lee Rainie, "The Web at 25 in the U.S.," Pew Research Center, February 27, 2014, pg. 1 (report available at http://www.pewinternet.org.
[4] "Global - Broadband and FttH – Key Statistics and Insights,"Budde Comm, http://www.budde.com.au/Research/Global-Broadband-and-FttH-Key-Statistics-and-Insights.html?r=51 (accessed January 2014).
[5] Cheris Carpenter, "Digital Dystopia: Overcoming Digital Deprivation in the United States," pg. 2.

Importance of Broadband

As summarized in the Foreword, the internet has become an integral part of life for many people. Across the United States and around the world, people use the internet to perform work, search for employment, research and purchase products and services, and communicate with friends, family, acquaintances, and strangers across the street and around the world. Since 2000, the number of websites has expanded exponentially.

Initially, organizations provided information to those they served via static websites. Business and government entities posted useful data and their phone number, address, and hours of operation on their website. Conducting meaningful interactions required in person, telephone, and/or mail communication. However, as the internet matured, many organizations' websites became dynamic sites capable of providing information and facilitating transactions with the organization. This change allowed organizations to harness the internet to increase operational efficiency. The ability to conduct online transactions gave people another option to interact with businesses and government, often allowing easier and faster completion of tasks.

As of 2014, many organizations have moved certain transactions entirely online. In these instances, internet transactions are not merely an option for those who prefer to perform tasks via the web; internet transactions are a requirement. Therefore, people without internet access or digital literacy skills are significantly disadvantaged because they cannot perform certain tasks.

Furthermore, because many newer internet sites feature photos, videos, and interactive forms and allow users to upload files, using these sites requires the transmission of large amounts of data at relatively fast speeds. Interacting with these sites via slow dial-up internet is nearly impossible. Using these sites requires high-speed broadband internet access.

The increase in the number and type of functions on a modern website and the resulting need for faster broadband internet, combined with the fact that some interactions must occur online because the organization no longer conducts that interaction in person, via phone, or via mail, has made broadband a requirement for modern life. Just like heat, electricity, indoor plumbing, running water, and the telephone, broadband internet has become a utility. Broadband is no longer a luxury. People need broadband to survive in the modern world.

Individuals and Organizations Shift to Online Transactions

Operational Tasks

In 2014, in the United States, all major corporations, non-profit organizations, and government entities and many smaller organizations host interactive websites that allow customers, clients, and constituents to research and purchase products and services and resolve problems without speaking to a person. From an organizational perspective, this can improve efficiency in serving clients, especially for simple and routine transactions. From the perspective of web savvy customers, this can improve efficiency in interacting with those organizations for certain transactions.

To channel customers to their website, television and radio ads often highlight the information available on the corporate website and the website address. People who telephone a major corporation often hear a recorded message directing them to the website. After providing that information, the recording may tell callers what steps to take to speak with a person.

Therefore, despite the ability to interact with the organization via phone or sometimes via mail or in person, it is clear that many organizations prefer to channel certain interactions to the internet because this forum provides benefits to both the organization and its clients in conducting certain transactions.

Some businesses require the fastest broadband because they use broadband for work tasks beyond simple transactions with customers. For example, one entrepreneur cited in a New York Times article said that she moved from Denver to Kansas City for its $70 per month Google Fiber connection. She said that she needed the very fast internet connection to develop an application that allows musicians around the world to jam online in real time. An entrepreneurial couple relocated from Los Angeles to Wilson, NC to reduce costs for the high-speed broadband required to run their company, which produces special effects for commercials, television, and feature films.[6]

In the 19th and 20th centuries, manufacturers located in major urban centers for access to a large labor pool and transportation networks. In the 21st century, companies need broadband to access a worldwide labor force of knowledge workers and clients. As demonstrated in the prior examples, for certain businesses, broadband access is so important that they will sacrifice the considerable benefits of locating in major metropolitan areas.

The previous examples also reveal that mid-size cities and rural areas with high-speed broadband can attract firms that previously may not have located there. As more tasks move online, the consumer demand for broadband will increase and perhaps along with it, the pressure for local officials to address broadband deficits if private sector internet service providers (ISPs) do not.

Online recruitment

Most organizations increased their use of online employee recruitment tools dramatically during the 21st century's first decade. In 1999, less than one-third of Fortune 500 companies used any form of online recruitment, including posting open positions on the firm's corporate website. By 2003, that figure had jumped to 94%; as of 2007, it was 100%.[7]

[6] Kate Murphy, "For the Tech-Savvy With a Need for Speed, a Limited Choice of Towns With Fiber," New York Times, April 2, 2014, http://www.nytimes.com/2014/04/03/technology/personaltech/for-the-tech-savvy-with-a-need-for-speed-a-limited-choice-of-towns-with-fiber.html?_r=1.

[7] John Younger, "Online Job Recruitment: Trends, Benefits, Outcomes, and Implications," *OnRec*, November 6, 2007, http://www.onrec.com/news/news-archive/online-job-recruitment-trends-benefits-outcomes-and-implications.

By 2012, many organizations had transitioned to 100% online recruiting. In remarks at an event on the future of broadband in the United States, then Federal Communications Commission Chair, Julius Genachowski, said "Almost all Fortune 500 companies post their job openings *exclusively* online. Almost all require online job applications – from Wal-Mart and Target, to many small businesses."[8]

In its section on online applications, the United States' nationwide career one stop website, begins with the following phrase, "Today, many employers expect job seekers to apply for jobs online."[9]

Organizations use the internet to recruit candidates because the increased efficiency saves money. The chart below visualizes the dramatic difference in average cost of recruiting new hire via the internet ($377) or via a typical metropolitan newspaper ($3,295).[10]

In addition to their own website, for employers, the use of social networking sites, particularly LinkedIn, can increase their visibility among candidates who are not actively looking for a job. Organizations use social networking sites to look for passive job candidates, create interest in jobs by posting information or contributing to discussions, search for candidates, and create a group page to post information and career opportunities. In 2013, approximately 77% of organizations reported using social networking sites for recruiting. This is an increase from 2011 (56%) and 2008 (34%).[11]

For candidates, the use of social networking sites can expose them to employers who may be a perfect match for their skills, allowing them to promote themselves to employers outside of the context of a formal job application.[12]

In 2003, 45% of job seekers said that they had used the internet as part of their job search. By 2006, a survey conducted by the Society for Human Resource Management suggested that 96% of job seekers use online resources in their job searches. For a growing number of job hunters, the concepts of job search and online job search have become synonymous.[13] Furthermore, research indicates that people with broadband access stay in the job market longer. During the United States' 2008 to 2009 Great

[8] Julius Genachowski, FCC Chairman, Remarks at Comcast Internet Essentials Event sponsored by Joint Center for Political and Economic Studies, Washington, DC, September 24, 2012.
[9] Careeronestop website: http://www.careeronestop.org/JobSearch/ResumesandApplications/online-applications.aspx (accessed December 2013.)
[10] John Younger, "Online Job Recruitment: Trends, Benefits, Outcomes, and Implications," 2011.
[11] Key Findings: Recruiting Job Candidates, Society for Human Resource Management, 2013.
[12] Key Findings: Recruiting Job Candidates, Society for Human Resource Management, 2013.
[13] John Younger, "Online Job Recruitment: Trends, Benefits, Outcomes, and Implications," *OnRec*, November 6, 2007, http://www.onrec.com/news/news-archive/online-job-recruitment-trends-benefits-outcomes-and-implications.

Recession, many workers exited the job market due to discouragement. Having broadband access reduced the rate at which discouraged unemployed workers left the job market.[14]

Clearly, as organizations moved recruiting online, job hunters followed. Likewise, as job hunters increased their use of the internet in job searches, employers moved recruiting online. The process of matching job seekers with open positions is one example of a transaction that has moved online during the last few years. Although some employers still accept non-internet applications, in many instances, employers only accept online applications.

The rapid movement of important transactions online is not limited to linking people and jobs. A list of other tasks now typically conducted online includes:

- Purchasing bus, train, or plane tickets
- Applying for college or graduate school
- Applying for unemployment, food stamps, or other public benefits
- Buying items used in daily life like clothes and food
- Looking for a place to live
- Participating in the community's political discourse

While people can conduct many tasks offline, using the internet can save time and money. In the case of political discourse, however, lack of online access may have ramifications beyond the need to expend extra time and money to complete a task.

Online Civic Engagement

Because a large share of political debate now occurs exclusively online, lack of internet access robs people of the chance to express themselves and to hear the opinions of others, thereby hindering their ability to gather information, debate with others, and make reasoned judgments required of participants in democracy.[15]

In New Orleans, David Eber of the non-profit Lower Ninth Ward Center for Sustainable Engagement and Development says that it is difficult to engage offline citizens. He cannot communicate with most community members because they lack internet. Therefore, in addition to blogs and e-newsletters, he considered instituting a block captain system to allow him to contact people with internet who would relay messages and information to neighbors without internet access.[16]

Similarly, Ward McClendon of the Ninth Ward Village community center said that many people lost their property after Hurricane Katrina because they could not access vital information about the property.[17] Clearly, many New Orleanians incur negative consequences due to their lack of broadband access.

A Michigan State University two-year study of the academic effects of household internet access in poor, mostly minority, single-parent families found that children with home internet earned higher standardized test scores for reading and higher grade point averages than students without internet access at home.[18] Likewise, students who took Advanced Placement courses through the Florida Virtual School (FLVS) scored higher on their Advanced Placement (AP) exams than students in public high

[14] John B. Horrigan, Ph.D., "Broadband and Jobs: African Americans Rely Heavily on Mobile Access and Social Networking in Job Search," Joint Center for Political and Economic Studies, October 2013, pg. 3.
[15] Anthony E. Varona, "Toward a Broadband Public Interest Standard," American University Washington College of Law, 2009, pp. 38, 52.
[16] Matt Davis, "Poorer communities continue to suffer lack of broadband access – and related opportunity," *The Lens*, May 24, 2012, http://thelensnola.org/2012/05/24/broadband-acces/ (accessed January 2014).
[17] Matt Davis, "Poorer communities continue to suffer lack of broadband access – and related opportunity," *The Lens*, May 24, 2012, http://thelensnola.org/2012/05/24/broadband-acces/ (accessed January 2014).
[18] Anthony E. Varona, "Toward a Broadband Public Interest Standard," American University Washington College of Law, 2009, pg. 84.

schools. On a scale of 1 to 5, the FLVS students had an average score of 3.05 on AP exams while public high school students had an average score of 2.49 on AP exams.[19]

By describing some negative consequences of inadequate broadband access, the previous examples support the idea that the move to online-only transactions harms many people. To rectify this situation, American society must find a way to bring broadband to those who lack access.

Attrition of Old Technology; Adoption of New Technology

The United States government has asked American households about their access to a landline telephone for placing and receiving phone calls since the 1960 census[20] underscoring the importance of long distance communications to Americans.

Since 2000, a growing share of Americans no longer use landline telephones. In a 2012 survey, the National Health Statistics Report (NHSR) found that 39% of American households exclusively use wireless phones for voice calls; another 16% have a landline, but rarely use it, receiving all or almost all calls on their mobile phones.[21] In summary, more than half of Americans prefer to use cell phones for voice calls. The NHSR survey also revealed that only 8.6% of American households have access only to a landline phone.[22]

These facts demonstrate that most Americans use cell phones and many are dependent upon cell phones to meet their telecommunications needs. Louisiana residents follow this pattern of increasing reliance upon mobile phones for voice calls as shown in the table below.

Louisianans Comparative Use of Cell Phones and Landlines for Voice Calls - 2013		
	Estimated % living in type of household[23]	
Type of Household	**Adults**	**Children**
Wireless Only	36%	45%
Wireless Mostly	17%	22%
Dual-use	26%	24%
Landline Mostly	12%	5%
Landline Only	7%	***
No telephone service	2%	2%

Notes: *** Estimate has relative standard of error greater than 50%; not shown.

In addition to voice calls, Americans increasingly rely upon their cell phones for internet access. For many, mobile internet access supplements fixed wireline access at home. For others, mobile phones provide their only option for internet access.

As of 2012, 70% of US adults have a broadband (i.e. not dialup) connection. In addition, 10% of Americans lack a home broadband connection but own an internet accessible smartphone. Many of

[19] "The Iowa Broadband Landscape," Connect Iowa PowerPoint presentation, April 9, 2013, slide 12.
[20] Census website: http://www.census.gov/hhes/www/housing/census/historic/phone.html (accessed December 2013).
[21] "Wireless only households continue to surge," *Speedmatters*, December 19, 2013, http://www.speedmatters.org/blog/archive/wireless-only-households-continue-to-surge/?utm_medium=email&utm_source=speedmatters&utm_campaign=20131223BlogUpdate#.Urh_qZaVA-M (accessed December 2013).
[22] Stephen J. Blumberg, Ph.D., Nadarajasundaram Ganesh, Ph.D., Julian V. Luke, and Gilbert Gonzales, M.H.A., "Wireless Substitution: State-level Estimates From the National Health Interview Survey, 2012," *NHSR – Number 70*, December 18, 2013, pg. 1.
[23] Stephen J. Blumberg, Ph.D., Nadarajasundaram Ganesh, Ph.D., Julian V. Luke, and Gilbert Gonzales, M.H.A., "Wireless Substitution: State-level Estimates From the National Health Interview Survey, 2012," *NHSR – Number 70*, December 18, 2013, pg. 8.

those using smartphones to obtain home internet access are Black and Latino.[24] Taken together, this information shows that Americans, especially minorities, increasingly rely on cell phones for voice calls *and* for internet access.

As wireless traffic increases, mobile service providers offload much of that traffic onto wired networks.[25] The increasing use of wireless and the need for wireless services to utilize wired networks indicate that society requires both wireline and wireless broadband to meet user needs. Therefore, broadband planners should address the necessity for both wireline and wireless broadband access.

Minorities More Likely to Rely on Internet for Job Search

Studies completed in 2012 reveal that minorities are more likely than other segments of the population to use the internet to seek and apply for employment and are more likely to consider the internet very important to the success of their job search.[26] When most recently looking for work, 36% of African Americans said they applied for a job online compared to 26% for all respondents. Furthermore, 50% of African Americans deemed the internet important to their last job search while only 36% of all respondents called the internet important to their prior job search.[27]

Contrastingly, Americans in general frequently cited personal contacts as critical to their job search. In a recent survey, 54% of respondents cited personal contacts as most important to their last job search.[28]

The survey did not address why African Americans are more dependent on online job searching. Perhaps African Americans must apply for jobs via the internet because they lack contacts with target employers.

The study's responses also suggest that minorities are more likely to rely on social media and mobile devices for job search than the general population. Among people using the internet for job search:

- 47% of African Americans said they have used their smartphone for job search
- 36% of Latinos said they have used their smartphone for job search
- 24% of Whites said they have used their smartphone for job search[29]

The survey did not delve into the reasons for minorities' greater reliance on mobile devices when looking for employment. However, one may speculate that minorities' lesser access to wireline broadband may force them to use mobile devices as a less expensive substitute.

Although African Americans are more reliant on the internet for job search, African Americans are more likely to have less than average digital literacy skills. Although the differences are not large, there is a consistent pattern of African Americans being somewhat less likely to say they understand a particular

[24] Tammy Parker, "10 percent of U.S. adults rely solely on smartphones for broadband internet, study says," *FierceWirelessTech*, August 26, 2013, http://www.fiercewireless.com/tech/story/10-percent-us-adults-rely-solely-smartphones-broadband-internet-study-says/2013-08-26 (accessed December 2013).
[25] Tammy Parker, "10 percent of U.S. adults rely solely on smartphones for broadband internet, study says," *FierceWirelessTech*, August 26, 2013, http://www.fiercewireless.com/tech/story/10-percent-us-adults-rely-solely-smartphones-broadband-internet-study-says/2013-08-26 (accessed December 2013).
[26] John B. Horrigan, Ph.D., "Broadband and Jobs: African Americans Rely Heavily on Mobile Access and Social Networking in Job Search," *Joint Center for Political and Economic Studies*, October 2013, Foreword.
[27] John B. Horrigan, Ph.D., "Broadband and Jobs: African Americans Rely Heavily on Mobile Access and Social Networking in Job Search," *Joint Center for Political and Economic Studies*, October 2013, pg. 7.
[28] John B. Horrigan, Ph.D., "Broadband and Jobs: African Americans Rely Heavily on Mobile Access and Social Networking in Job Search," *Joint Center for Political and Economic Studies*, October 2013, pg. 5.
[29] John B. Horrigan, Ph.D., "Broadband and Jobs: African Americans Rely Heavily on Mobile Access and Social Networking in Job Search," *Joint Center for Political and Economic Studies*, October 2013, pg. 1.

term or concept very well compared to all survey respondents.[30] Although most respondents were less confident in their ability to find information easily with their mobile device (as compared to their computer), African Americans greater use of mobile technology resulted in African Americans displaying more confidence in their mobile internet search abilities than survey respondents in general.[31]

Similarly, Latinos exhibit greater reliance on wireline and mobile internet for job search. However, due to small sample size, the findings are more illustrative than statistically meaningful.[32]

Minorities and Less Educated More Likely to Be Unemployed

Furthermore, the fact that unemployment rates for people living in the United States vary by race and educational attainment shows that the lingering effects of the Great Recession do not manifest themselves equally for all segments of the population.

As shown in the first table below, African Americans and Latinos are more likely to be unemployed than whites. In fact, nationally, the unemployment rate for African Americans has been twice the rate for white Americans since 1954 when the Bureau of Labor Statistics first began tracking employment status by race.[33] Likewise, people with lesser educational attainment are more likely to be unemployed than people with greater educational attainment as shown in the second table. African Americans and Latinos tend to lag whites in educational attainment as shown in the third table.

United States Unemployment Rates by Race / Ethnicity – November 2013[34]

		Change in Points	
Race/Ethnicity	**Rate**	**Month/Month**	**Year/Year**
White	6.2%	-0.1	-0.6
Black or African American	12.5%	-0.6	-0.7
Hispanic or Latino	8.7%	-0.4	-1.2
Asian	5.3%	+0.1	-1.1

United States Unemployment Rates by Education – November 2013[35]

		Change in Points	
Education Level Achieved	**Rate**	**Month/Month**	**Year/Year**
Less than High School	10.8%	-0.1	-1.3
High School Grad; No College	7.3%	0.0	-0.8
Some College or Associate Degree	6.4%	+0.1	-0.2
Bachelor's Degree or Higher	3.4%	-0.4	-0.5

[30] John B. Horrigan, Ph.D., "Broadband and Jobs: African Americans Rely Heavily on Mobile Access and Social Networking in Job Search," *Joint Center for Political and Economic Studies*, October 2013, pg. 2, 13.
[31] John B. Horrigan, Ph.D., "Broadband and Jobs: African Americans Rely Heavily on Mobile Access and Social Networking in Job Search," *Joint Center for Political and Economic Studies*, October 2013, pg. 14.
[32] John B. Horrigan, Ph.D., "Broadband and Jobs: African Americans Rely Heavily on Mobile Access and Social Networking in Job Search," *Joint Center for Political and Economic Studies*, October 2013, pg. 17.
[33] Drew DeSilver, "Black unemployment rates is consistently twice that of whites," August 21, 2013, http://www.pewresearch.org/fact-tank/2013/08/21/through-good-times-and-bad-black-unemployment-is-consistently-double-that-of-whites/ (accessed December 2013.)
[34] Department of Numbers website: http://www.deptofnumbers.com/unemployment/demographics/ (accessed December 2013).
[35] Department of Numbers website: http://www.deptofnumbers.com/unemployment/demographics/ (accessed December 2013).

United States Educational Attainment by Race/Ethnicity – 2012[36]		
	High School or Higher	**Bachelor's or higher**
Total	88%	31%
White	93%	35%
Black	86%	21%
Latino	65%	15%
Asian/Pacific Islander	89%	51%
American Indian/Alaskan Native	82%	17%
Two or more races	91%	27%

Most New Orleans Residents Are Minority

Furthermore, New Orleans' population is overwhelmingly African American. The 2010 Census recorded the following population breakdown for the City of New Orleans – 60% black or African American, 30% white, 3% Asian, 5% Hispanic or Latino. The remaining 2% identified themselves in other racial and/or ethnic categories.[37]

Conclusion - New Orleanians Need High Quality Broadband

In summation, as documented in prior sections of this report, four major facts support the need for access to high speed broadband in New Orleans. These are:

- Broadband is essential to perform basic tasks such as employee recruiting or job search
- Most New Orleans residents are racial or ethnic minorities
- Some racial and ethnic minorities are more likely to be unemployed than whites
- Some racial and ethnic minorities rely more heavily on the internet for job search

Additionally, because minorities frequently depend more heavily on mobile broadband than whites, as discussed previously, New Orleans clearly needs robust wireline and wireless broadband.

[36] National Center for Education Statistics website: https://nces.ed.gov/programs/digest/d12/tables/dt12_008.asp (accessed December 2013).
[37] Census 2010 - United States Census Bureau website: http://quickfacts.census.gov/qfd/states/22/2255000.html (accessed December 2013).

Governments Use Broadband to Provide Services

In addition to residents and businesses, federal, state, and local governments need high quality broadband to provide services to constituents. While government technically can perform many tasks without broadband, those methods are often slow and inefficient. Constituents expect a certain speed, quality, and accuracy from government; meeting these expectations requires broadband.

Like their private sector counterparts, 21st century government organizations use broadband to conduct many operational tasks. Broadband helps government to accomplish a range of goals, including but not limited to, improving the handling of data, enhancing internal and external communication, promoting economic development, and fostering resilience in infrastructure and operational procedures.

Broadband improves data collection, storage, and access to enhance organizational effectiveness

Use of broadband can increase the speed of data collection, improve the accuracy of data collected, ensure safe and secure storage of data, and provide access to data for those who need it.

For example, police departments collect and analyze data to identify high-crime areas or people at risk of committing a crime. Earlier availability of data allows police to respond to shifts in crime as these occur rather than afterwards. The availability of more accurate data allows police to target resources to higher-risk areas and individuals to discourage crime. Likewise, some police departments use technology to identify the location of a shooting and the shooter's movements, which improves the speed and efficacy of police response to shootings. In both examples, new tools help police protect public safety. The collection and transmission of data used by these tools requires broadband.

In addition to data collected as part of incident reporting (e.g. crime data), governments also survey constituents about their concerns, satisfaction levels, political tendencies, and demographic characteristics. Governments use this data to improve service delivery and to develop new programs. Online surveys can obtain information faster, thereby saving time and money. Use of a database allows officials to analyze survey responses and illustrate key pieces of information. However, until all residents can access and use broadband at home, this survey method will have limited impact.[38]

In addition to facilitating faster and more accurate data collection, broadband allows organizations to create digital duplicates of electronic files and paper documents for storage at remote locations, to ensure the security of irreplaceable files during emergencies. In addition to guaranteeing the safety of files, a system that allows government employees 24-7 access to documents from any location could improve employee efficiency by reducing the amount of time needed to find information.[39]

In another example, the Port Authority of New York and New Jersey installed networked LED lights at Newark Airport. The fixtures, along with sensors and video cameras, form a wireless network that collects and feeds data into software that can spot long lines, recognize license plates, identify suspicious activity, and alert appropriate staff.[40] Upon receiving data, managers can send additional staff to help travelers move through lines faster and deploy security staff to areas of suspicious activity.

[38] Louisiana Broadband Initiative website: http://broadband.louisiana.gov/lbi_communities.asp (accessed February 2014).
[39] Louisiana Broadband Initiative website: http://broadband.louisiana.gov/lbi_communities.asp (accessed February 2014).
[40] Diane Cardwell, "At Newark Airport, the Lights Are On, and They're Watching You," *New York Time*s, February 17, 2014, http://mobile.nytimes.com/2014/02/18/business/at-newark-airport-the-lights-are-on-and-theyre-watching-you.html?nl=todaysheadlines&emc=edit_th_20140218&_r=0&referrer (accessed February 2014).

Once perfected in closed environments like airports, cities may consider adopting these systems. For example, Copenhagen is installing 20,000 streetlamps as part of a system that eventually could control traffic, monitor carbon dioxide, and detect full garbage cans.[41] In addition to public safety enhancements, such systems allow organizations to improve operations and customer service.

Utilities (both public and private) are beginning to use new technology to improve their operations. For example, electric utilities' smart metering systems track energy use in intervals of an hour or less and transmit the data to the utility daily for monitoring and billing purposes. Likewise, water utilities use such systems to track customers' water use. Such systems help utilities minimize staff time dedicated to collecting usage data for billing purposes, thereby saving money.

Ultimately, cities hope that better and more affordable broadband access for public-sector agencies will improve service delivery and facilitate the introduction of improvements to city processes. This may be due to a larger share of employees having broadband access, enabling mobile access for employees who currently have only desktop access, faster internet speeds, increased reliability, or other improvements. Either way, cities hope that improved broadband access will facilitate data collection, analysis, and dissemination and general communications by workers improving efficiency and effectiveness. For first responder agencies, efficiency and effectiveness improvements due to better and more affordable broadband could assist the efforts of EMS, police, fire, and homeland security to protect public safety.

Broadband enhances internal and external communications

Use of broadband can help government to communicate with a larger number of people by expanding the geographic reach of government announcements. This can attract more attendees to public events by allowing event-related advertising to reach people who are not in close proximity to the event.[42]

In addition to permitting communication with a larger number of people, broadband also allows government to improve the quality of communication with employees and constituents. In the past, opportunities for 2-way dialogue between government and constituents were limited to in-person, phone, and mail encounters. With broadband, government can utilize new channels - email, websites, and social media - to communicate with constituents. The new channels make communication easier by providing more options. Simultaneously, the new channels make communication more difficult by raising constituent expectations for the frequency and quality of government communication.

In an era of 24-7 access to information, people demand greater transparency and honesty from government. Government websites that provide answers to frequently asked questions and insight to government policies and procedures enable transparency and help government earn citizens' trust. Trust can generate public support and participation, which can lead to economic and social progress.[43]

In the realm of public safety and homeland security, access to broadband allows a community to send and receive email and web alerts on any topic that could threaten or help the community.[44]

[41] Diane Cardwell, "At Newark Airport, the Lights Are On, and They're Watching You," *New York Time*s, February 17, 2014, http://mobile.nytimes.com/2014/02/18/business/at-newark-airport-the-lights-are-on-and-theyre-watching-you.html?nl=todaysheadlines&emc=edit_th_20140218&_r=0&referrer (accessed February 2014).
[42] Louisiana Broadband Initiative website: http://broadband.louisiana.gov/lbi_communities.asp (accessed February 2014).
[43] Louisiana Broadband Initiative website: http://broadband.louisiana.gov/lbi_communities.asp (accessed February 2014).
[44] Louisiana Broadband Initiative website: http://broadband.louisiana.gov/lbi_communities.asp (accessed February 2014).

Broadband helps promote economic development and socioeconomic equity

Government use of broadband helps it provide services as discussed above. Likewise, government provision of broadband for citizens can contribute positively to economic development indicators like education levels, unemployment and crime rates, and population growth.

Adults with low levels of education can utilize online GED or college courses. High school students can use online ACT and SAT study tools. In both instances, online tools can help people access education to become eligible for better paying jobs, which supports the socio-economic mobility of individuals. Similarly, a better-educated workforce attracts businesses to a community and creates job growth. With more people employed, crime rates decrease.[45] The combination of more jobs, better paying jobs, and lower crime rates both reflect and promote economic development for the community as a whole.

Broadband is critical to creating resilient systems

During the past few decades, many locations worldwide have experienced extreme weather, major accidents, or terrorist attacks. Severe weather includes, but is not limited to, more storms, more intense storms, and more flooding and drought episodes. Such events can wreak havoc on infrastructure and systems deployed by public and private sector organizations.

In addition to external events, other possible threats include equipment and system malfunction. Both the private and public sectors have responded to such threats by trying to improve the resilience of their infrastructure, systems, and operational procedures.

Resilience is a concept adopted from biology and psychology; it refers to the ability to recover from physical and/or emotional stress. Both individuals and systems require resilience to survive and ultimately to thrive. Observers often refer to a resilient person's ability to bounce back from hardships like job loss, health problems, or the death of a loved one. Likewise, scientists frequently try to gauge an ecosystem's ability to recover from environmental disasters.

For example, since the 2010 BP Deepwater Horizon oil spill that introduced millions of gallons of crude oil to the Gulf of Mexico, residents of the affected areas and environmentalists have tried to determine a course of action to restore wetlands and protect the health of resident plant and animal species. The ability of individual plants and animals to survive and reproduce is critical to the overall resilience of the Gulf Coast's wetlands ecosystems.

More recently, people have begun to think about the resilience of their communities. Initially, efforts to improve community resilience focused on the built environment (e.g. transportation, drinking water, waste water, storm water, technology, and electric power generation/distribution systems, etc.) other types of infrastructure, and buildings. More recently, people expanded the definition of community resilience to encompass the natural environment, the economy, government policies, and the physical and emotional well-being of its inhabitants.

To improve its ability to provide accurate information and instructions to residents during emergencies, the City of New Orleans worked to improve the resilience of its communications infrastructure and operational procedures. The City:

[45] Louisiana Broadband Initiative website: http://broadband.louisiana.gov/lbi_communities.asp (accessed February 2014).

- Has started and continues to build a Common Operational Picture that contains 911 data, weather feeds, 311 calls for service, location of community assets, and other data sets into a single map for situational awareness during emergencies

- Upgraded its website and developed an emergency version of the website and new protocols to provide the public with consistent answers to questions

- Developed the Nola Ready campaign to educate residents on emergency preparedness, allow registration for custom emergency notifications, or apply for the Special Needs Registry for mobility impaired individuals who need help evacuating

- Adopted new emergency notification technologies such as a "reverse 911" feature that can call people with notifications tailored to their geographic area

The focus on resilience even extends to organizational processes and the economy in general.

- For example, smart grid technology allows electric utilities to monitor individual pieces of equipment and the network as a whole, to observe malfunctions, and to troubleshoot and fix problems remotely. Smart grid technology also allows utilities to route power in the cheapest, most efficient manner possible.
- Smart technology applied to water systems can monitor pipes for impending leaks. This allows water utilities to fix pipes before they begin to leak, thereby saving water and money.
- Smart water management could involve sensors to monitor drainage to improve flood control.

The ability to discover and address issues like leaky pipes or malfunctioning electric meters before these become major problems saves a utility time and money and improves network resilience. Many cities are applying these concepts to municipally owned and operated infrastructure systems like streets, traffic lights and cameras, public buildings, parks, etc. These applications require citywide broadband.

Improving the resilience of economic development initiatives also requires access to high quality, affordable broadband. In support of workforce development, cities may use broadband to:

- Facilitate work force training programs by expanding delivery methods beyond traditional classroom instruction to include video sessions, remote/online courses, simulations, etc.
- Facilitate multi-tiered technology training from digital literacy to digital media
- Provide access to crucial information about jobs, healthcare, and other topics to vulnerable, low income populations – thereby reducing the “digital divide”
- Incent the establishment of small community-based training locations

Cities also may use high quality, affordable broadband to attract higher quality jobs and development.

- Modern manufacturing, digital media, and film industries require broadband
- Residential developers can include internet/tv/phone service in the rent, thereby differentiating their product from other housing options

In the United States, many existing networks use current generation wireline broadband technologies which are described in a subsequent section of this report. These networks are sufficient to perform basic, non real-time tasks (e.g. using email, web browsing, and downloading SD and HD video) because they offer adequate throughput (i.e. download and upload speeds), availability, and reliability. However, many existing networks are insufficient to perform real-time tasks (e.g. streaming music and video,

teleconferencing, IP TV, and 2-way video gaming) that technologically advanced users demand because these networks don't offer the low latency, packet loss, and jitter required for real-time tasks.[46]

If city governments desire to use broadband to meet the environmental, organizational, and economic challenges described previously, they need networks capable of handling real-time tasks. However, before a city can leverage broadband networks or any other type of technology to foster resilience, each city must create a vision based on its strengths, challenges, and opportunities and develop policies to achieve that vision. Once a city has created its vision and supporting policies, it will be able to request products and services to implement its policies from private-sector and philanthropic partners.[47]

Conclusion - New Orleans Needs High Quality Broadband

Having established the importance of broadband due to the growing dependence of people, business and government on the internet to survive in the modern world, the next section describes current technology options available to access the internet while the section after that discusses specific technology options available in New Orleans.

Subsequent sections define key terms used in discussing internet access and describe differential broadband adoption globally, nationally, within Louisiana, and in New Orleans and some of the underlying causes of differential broadband adoption to establish the need to plan for broadband to ensure adequate broadband access to the people least likely to have it. The document's final sections explain the need for government involvement to address inadequate and unequal broadband access and challenges to increased public sector involvement in broadband planning and provision

[46] "The Iowa Broadband Landscape," Connect Iowa PowerPoint presentation, April 9, 2013, slide 9.
[47] Robert Puentes and Adie Tomer, "Getting Smarter About Smart Cities," Brookings, April 23, 2014, http://www.brookings.edu/research/papers/2014/04/23-smart-cities-puentes-tomer.

Available Broadband Technologies

The term **broadband** has several definitions. For those in the telecommunications industry, broadband refers to the wide bandwidth characteristics of a transmission medium and its ability to transport multiple signals and traffic types simultaneously. The medium can be twisted pair, coax, optical fiber, or wireless. In contrast, the term **baseband** describes information traveling across a single channel.[48]

However, for consumers, who are laypersons rather than telecommunications experts, the important qualities of broadband are that fact that it is always on and available to deliver digital data, voice and video simultaneously to and from users.[49] Current generation broadband refers to the existing cable, DSL, and wireless systems that offer speeds up to 10 mbps while next generation broadband refers to future fiber, cable, DSL, and wireless technologies that will provide speeds in excess of 100 mbps, potentially up to 1 gbps.[50]

Although definitions of "high-speed" vary, most agree that it is faster than dial-up internet. Therefore, for most people, broadband refers to very fast, always available, two-way digital voice, data, and video communications regardless of wavelength size or technology used.

Consumers usually refer to the firms that provide voice, data, and video service **as telecommunications service providers** (aka **telecoms** or **telcos**) or as **internet service providers** (aka **ISPs**). Because these firms now provide the same services, consumers use these terms interchangeably. However, historically telecoms and cable firms were part of two completely separate industries.

Telecoms began life in the late 19th century as providers of telephone services. Today, they provide voice (telephone), video (TV), and data (internet) services using legacy copper (twisted pair and DSL) networks. Cable TV began operation in 1948.[51] Today, cable providers provide voice, video, and data services over their legacy copper (coaxial cable) networks. Therefore, originally telephony and TV were 2 mutually exclusive services offered over separate networks utilizing different transmission technology.

Much later, people realized that each network could deliver voice, video, and data leading to the current competition between two wired communication infrastructures to the home that offer redundant services.[52] Because telecoms and cable companies now provide the same suite of services, most consumers think of them interchangeably and this report refers to them interchangeably.

Because the technology landscape changes quickly with processing power doubling every 18 months and new applications developed, proper broadband planning must address near term needs for which "current generation" broadband may be sufficient as well as long-term goals which may require much faster "next generation" broadband. The following section describes current and next generation wireline (aka wired) broadband technologies. The subsequent section discusses wireless broadband technologies.

[48] Wikipedia: http://en.wikipedia.org/wiki/Broadband (accessed October 2013).
[49] Seattle Telecommunications Task Force report, May 2005, pp. 8-9.
[50] Planning and Broadband: Infrastructure, Policy, and Sustainability, pg. 12, American Planning Association PAS Report 569, July 2012.
[51] Wikipedia: http://en.wikipedia.org/wiki/Cable_television_in_the_United_States (accessed February 2014).
[52] Ars Technica: http://arstechnica.com/tech-policy/2010/03/fiber-its-not-all-created-equal/ (accessed February 2014).

Current Generation Wireline Broadband Technologies

Introduction

Dial-up is the oldest internet technology; it uses the public switched telephone network's equipment.

The currency of the internet is bandwidth, the rate data transmission. The basic unit of measurement is bits per second. A bit or binary digit is the basic unit of information in computing and digital communications.[53] The greater the bandwidth, the less time needed to transmit data. Therefore, people typically confuse bandwidth with speed when in reality it is bandwidth that determines speed.

Because a bit is a small amount of data, referring to bandwidth transmission in bits per second would require very large numbers. Therefore, people developed a vocabulary based on multiples of 1000 to describe the very fast data transmission speeds of the internet as shown in the following table.

Transporting Information on the Internet Measured in Bits per Second[54]	
Kilobit (kbps)	1000 bits per second
Megabit (mbps)	1000 Kilobits or 1,000,000 bits per second
Gigabit (gbps)	1000 Megabits or 1,000,000,000 bits per second
Terabit (tbps)	1000 Gigabits or 1,000,000,000,000 bits per second

Dial-up uses the public telephone network and typically provides speeds of 40 to 50 kbps.[55] With such slow speeds, dial-up internet is **not** broadband internet. As discussed subsequently in this report, very few internet-connected Americans subscribe to dial-up; most Americans with home internet access use broadband to take advantage of its greater bandwidth transmission rates.

The rest of this section describes many technologies and services included in current generation broadband. The discussion covers oldest and slowest technologies first and progresses through time to end with the most recent, fastest technologies and services. The following section discusses next generation broadband.

Current Generation Broadband

Twisted pair, developed in the late 1800s following the invention of the telegraph, was used extensively by the telephone industry as it expanded during the 1900s. Twisted pair cables transmit signals over multiple pairs of twisted copper wires. Each pair of wires has a covering. The covered pairs of twisted wires lie in an outer cable. For extra protection, sometimes there is another layer between the covered wire pairs and the outer cable to eliminate crosstalk between adjacent cables.[56]

Digital subscriber line (DSL, ADSL, ADSL2+) - is a data transmission technology over phone network wires with 1.5 to 5 mbps bandwidth. Occasionally, speeds reach 20 mbps with DSL technology.[57] With DSL, voice and data travel over the same wires at different frequencies. Voice uses frequencies from 30

[53]Wikipedia: http://en.wikipedia.org/wiki/Bit (accessed December 2013).
[54] Rita Stull, "Launching FTTP in JULIET," *NATOA Journal – Volume 17, Issue 1,* Spring 2009, pg. 26.
[55] Second Interim Report Pursuant to State of Washington House Bill 2601, Technology Law and Public Policy Clinic – University of Washington Law School, June 2011, pg. 25.
[56] Matthew DeHaven and Priya Wasnikar, "What's the Fuss About Fiber? A Comparative Analysis of Fiber and Copper Physical Media," *NATOA Journal – Volume 17, Issue 1,* Spring 2009, pg. 13.
[57] Second Interim Report Pursuant to State of Washington House Bill 2601, Technology Law and Public Policy Clinic – University of Washington Law School, June 2011, pg. 25.

Hz to 4 KHz while data uses frequencies from 25 to 1104 KHz. In theory, data can travel at speeds up to 100 mbps.[58]

Broadband industry watchers believe that DSL operators who do not face substantial competition from cable are likely to upgrade to fiber to the node using VDSL, VDSL2, and VDSL2+ technologies based on local geographic and market conditions[59] rather than installing a true fiber network. The conservative American Enterprise Institute, normally a defender of cable and telephone companies, admits that DSL cannot provide the internet access the United States needs. On an April 7, 2014 episode of the Diane Rehm show, their Director of the Center for Internet, Communications, and Technology Policy, Jeffrey Eisenach, stated, "The vast majority of Europeans still only have DSL service available, which we in the United States consider really almost an obsolete technology now."[60] The telephone companies' tendency to retain and propagate an obsolete technology alarms industry watchers.

Coaxial cable or coax, developed in the 1970s and 1980s, carries video signals for cable television and radio frequency signals between antennas of wireless networks. Coax transmits signals over a copper central conductor. An insulating coating, protective shield, and an outer cable safeguard the central conductor against electromagnetic interference.[61] Typical speeds are 1 to 50 mbps.[62]

Summary of Current Generation Wireline Broadband Technologies

According to the National Institute of Standards and Technology (NIST), DSL is more likely to deliver the advertised bandwidth than cable although cable boasts higher average bandwidth. NIST's study revealed that DSL connections average 5.4 mpbs, while cable connections average 13.5 mbps. However, DSL connections deliver "download speeds above 80% of the assigned speed tier more than 80% of the time. By contrast, a significant fraction of cable connections received less than 80% of their assigned speed tier more than 20% of the time."[63]

NIST research also found differences in the location of congestion in cable and DSL networks. "While DSL networks suffer predominantly from congestion in the 'last mile,' distribution of congestion in cable networks exhibits variability, with a few cable networks congested mainly in the 'last mile' but the majority congested elsewhere, in the 'middle mile' or beyond," said the research authors.[64]

While significantly better than dial-up, existing copper broadband technologies - twisted pair, DSL, and coax - have significant drawbacks. As mentioned previously, bandwidth is inconsistent. In addition, because data transfer involves electrical signals, the data is less secure because it is possible to physically "tap" into the cables, especially twisted pair, and observe the data.[65]

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[58] Andrew Tarantola, "The Next Generation of DSL Can Pump 1Gbps Through Copper Phone Lines," *Gizmodo*, December 18, 2013, http://gizmodo.com/the-next-generation-of-dsl-can-pump-1gbps-through-coppe-1484256467 (accessed December 2013).
[59] "Global Broadband – Fibre is the Infrastructure Required for the Future," Budde Comm, http://www.budde.com.au/Research/Global-Broadband-Fibre-is-the-Infrastructure-Required-for-the-Future.html?r=51 (accessed January 2014).
[60] christopher, "American Enterprise Institute Scholar Calls DSL Obsolete," Community Broadband Networks, April 16, 2014, http://muninetworks.org/content/american-enterprise-institute-scholar-calls-dsl-obsolete.
[61] Matthew DeHaven and Priya Wasnikar, "What's the Fuss About Fiber? A Comparative Analysis of Fiber and Copper Physical Media," *NATOA Journal – Volume 17, Issue 1,* Spring 2009, pg. 13.
[62] Second Interim Report Pursuant to State of Washington House Bill 2601, Technology Law and Public Policy Clinic – University of Washington Law School, June 2011, pg. 25.
[63] Blog: "Cable falls behind DSL in delivering what it promises," July 17, 2013. http://www.speedmatters.org/blog/archive/study-cable-falls-behind-dsl-in-delivering-what-it-promises/?utm_medium=email&utm_source=speedmatters&utm_campaign=20130722BlogUpdate#.Ue7JFZaVBFk
[64] Blog: "Cable falls behind DSL in delivering what it promises," July 17, 2013. http://www.speedmatters.org/blog/archive/study-cable-falls-behind-dsl-in-delivering-what-it-promises/?utm_medium=email&utm_source=speedmatters&utm_campaign=20130722BlogUpdate#.Ue7JFZaVBFk
[65] Matthew DeHaven and Priya Wasnikar, "What's the Fuss About Fiber? A Comparative Analysis of Fiber and Copper Physical Media," *NATOA Journal – Volume 17, Issue 1,* Spring 2009, pg. 14.

Possible Future Improvement to Current Generation Wireline Broadband Technologies

G.fast - As of late 2013, G.fast, a new technology using a larger 106 MHz section of bandwidth, claims to achieve bandwidth of 1 gbps over copper telephone wires, which is on par with speeds offered by fiber optics. It is akin to a very fast DSL. There are some drawbacks. The upper end of G.fast's frequency range overlaps with FM radio spectrum, which can cause interference. G.fast's wide frequency range generates a lot of crosstalk between the bundled wires.[66] Telecom equipment vendor, Huawei said the reports of 1 gbps actually refer to the sum of upstream and downstream bandwidths.[67] Even if ISPs cut maximum speeds due to financial and technical considerations, if interference and crosstalk issues are resolved, 500 mbps speeds would represent a vast improvement in internet speeds for United States residents. Finalization of the G.fast standard should occur in 2014 with rollout to begin in 2016.[68]

Broadband over power lines (BPL) – or **power-line internet** or **powerband**, allows digital data transmission over public electric power distribution wiring. BPL uses higher frequencies, a wider frequency range, and different technology from other forms of power-line communications to provide communication over longer distances. Because BPL uses radio spectrum frequencies allocated to over-the-air communication, the prevention of interference to, and from, these services is a very important factor in designing BPL systems.[69]

To access internet, a computer (or any other device) would have to connect to a BPL modem which can use any outlet in an equipped building. This ease of use makes BPL attractive for bringing high-speed internet to rural areas. The power network infrastructure already exists. Users would have to purchase a relatively inexpensive device and subscribe to the service.[70]

BPL deployment faces challenges. First, power lines are inherently a very noisy environment. Device turning on or off and switching power supplies often introduce noisy harmonics to the line. Unlike coax or twisted-pair, the wiring does not reject noise. System design must accommodate these natural signaling disruptions. Hence, BPL is a compromise between wireless transmission (which also entails little control of the medium carrying signals) and wired transmission (but not requiring new cables).[71]

Second, because power distribution utilizes step-down transformers to reduce the voltage for customers' use and BPL signals cannot pass through transformers, the deployment of BPL will require attaching multiple repeaters to the transformers, which usually serve only a few premises. On the other hand, since bandwidth to the transformer is limited (because it serves only a few premises), this can increase the speed at which each household can connect. BPL could serve as the backhaul for wireless communication. Hanging wifi access points or cellphone base stations on utility poles could allow users within a certain range to connect with existing equipment.[72]

BPL also can use microwave frequencies to achieve even faster data transmission. While these may interfere with radio astronomy, the advantages of speeds competitive with fiber optics (up to 1 gbps) without new wiring may outweigh the drawbacks.[73]

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[66] Andrew Tarantola, "The Next Generation of DSL Can Pump 1Gbps Through Copper Phone Lines," *Gizmodo*, December 18, 2013, http://gizmodo.com/the-next-generation-of-dsl-can-pump-1gbps-through-coppe-1484256467 (accessed December 2013).
[67] Jon Brodkin, "500 Mbps Internet over phone lines might solve fiber's 'last mile' problem," *Ars Technica*, December 12, 2013, http://arstechnica.com/information-technology/2013/12/500mbps-internet-over-phone-lines-might-solve-fibers-last-mile-problem/ (accessed February 2014).
[68] Andrew Tarantola, "The Next Generation of DSL Can Pump 1Gbps Through Copper Phone Lines," *Gizmodo*, December 18, 2013, http://gizmodo.com/the-next-generation-of-dsl-can-pump-1gbps-through-coppe-1484256467 (accessed December 2013).
[69] Wikipedia: http://en.wikipedia.org/wiki/Broadband_over_power_lines (accessed December 2013).
[70] Wikipedia: http://en.wikipedia.org/wiki/Broadband_over_power_lines (accessed December 2013).
[71] Wikipedia: http://en.wikipedia.org/wiki/Broadband_over_power_lines (accessed December 2013).
[72] Wikipedia: http://en.wikipedia.org/wiki/Broadband_over_power_lines (accessed December 2013).
[73] Wikipedia: http://en.wikipedia.org/wiki/Broadband_over_power_lines (accessed December 2013).

G.fast, the DSL upgrade, and BPL represent intriguing opportunities to achieve the very fast speeds of next generation broadband using already deployed infrastructure and networks. Although spread of G.fast could improve broadband speeds, it would not increase competition, because the technology would be deployed by existing telephone companies. Given these firms' past refusal to upgrade their networks, they could delay the deployment of G.fast. On the other hand, the spread of BPL, which requires power infrastructure instead of telephone or cable infrastructure, could improve access to high-speed internet while also introducing more firms, energy providers, to the broadband market. The resulting increase in competition could spur price decreases for high-speed internet.

Conclusion - Current Generation Wireline Broadband Technologies

In conclusion, most current generation broadband services rely upon copper to transmit data as electrical signals. While much faster than dial-up, these services are susceptible to crosstalk and interference. Recent innovations like G.fast and BPL may provide the very fast speeds of fiber via existing infrastructure, but crosstalk and interference may hinder performance. Therefore, as of December 2014, providing the fastest and most reliable broadband requires next generation fiber optic technology, the subject the next section.

Next Generation Wireline Broadband Technologies

Introduction

This section discusses the laudable qualities of fiber optics, often hailed as the "holy grail" of communication technologies, due to its unlimited capacity and endless future scalability[74] and describes various types of fiber networks.

Fiber optic cable aka **fiber**- transmits data through glass cores via light rays. Cladding, coating, and a housing cable typically surround the glass core.[75] Fiber offers many benefits.

- Because fiber does not use electrical conduction, signals do not weaken at higher frequencies
- Signals sent over fiber do not lose strength with greater distance eliminating a need to amplify or regenerate signals
- Because fiber does not conduct electricity, it is immune to electromagnetic interference, which allows fiber deployment near power lines or in substations, where copper is infeasible
- Fiber cables do not corrode over time like metallic parts do[76]

All of these qualities make fiber easier and more cost effective to operate. Fiber offers theoretical tbps speeds, far exceeding the capability of the best copper options. Last, fiber data transmission is more secure because it is very difficult to tap into the cables without breaking the connection.[77]

According to broadband pundits, national fiber networks are necessary for the future. Fiber is the only technology to provide the capacity, reliability, and security required in telecommunications services.[78]

In the United States, Verizon's fiber service, dubbed FiOS Quantum Internet, offers bandwidth of 500 mbps upload and 100 mpbs download in some metropolitan areas, far exceeding cable bandwidth offerings. As of September 2013, FiOS service covered only 14% of U.S. homes. However, this service overlapped with 14% of Time Warner Cable's market, 19% of Comcast's market, and 64% of Cablevision's market. Consumers responded positively to availability of fiber. Even in markets where FiOS has been competing for 7 years, it posted a 6.4% growth rate in 2012.[79] Unfortunately, for communities without FiOS, Verizon has no plans to expand the fiber network beyond presently served communities. Instead, the firm will focus on improving penetration in communities it already serves.[80]

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[74] Matthew DeHaven and Priya Wasnikar, "What' the Fuss About Fiber? A Comparative Analysis of Fiber and Copper Physical Media," *NATOA Journal – Volume 17, Issue 1,* Spring 2009, pg. 12.
[75] Matthew DeHaven and Priya Wasnikar, "What' the Fuss About Fiber? A Comparative Analysis of Fiber and Copper Physical Media," *NATOA Journal – Volume 17, Issue 1,* Spring 2009, pg. 13.
[76] Matthew DeHaven and Priya Wasnikar, "What' the Fuss About Fiber? A Comparative Analysis of Fiber and Copper Physical Media," *NATOA Journal – Volume 17, Issue 1,* Spring 2009, pg. 14.
[77] Matthew DeHaven and Priya Wasnikar, "What' the Fuss About Fiber? A Comparative Analysis of Fiber and Copper Physical Media," *NATOA Journal – Volume 17, Issue 1,* Spring 2009, pg. 14.
[78] "Global Broadband – Fibre is the Infrastructure Required for the Future," Budde Comm, http://www.budde.com.au/Research/Global-Broadband-Fibre-is-the-Infrastructure-Required-for-the-Future.html?r=51 (accessed January 2014).
[79] "FiOS and U-verse challenge cable's broadband domination," Speedmatters Web team, August 30, 2013: http://www.speedmatters.org/blog/archive/fios-and-u-verse-challenge-cables-broadband-domination?utm_medium=email&utm_source=speedmatters&utm_campaign=20130903BlogUpdate#.UiZRhJaVA-M (accessed December 2013).
[80] "Verizon Won't Expand FiOS Beyond Current Franchise Obligations, CFO Tells Investors," Phillip Dampier, September 25, 2012, http://stopthecap.com/2012/09/25/verizon-wont-expand-fios-beyond-current-franchise-obligations-cfo-tells-investors/ (accessed December 2013).

In summation, fiber can carry more data over longer distances more reliably and securely than copper wire.[81] Because of these advantages over electrical transmission, optical fibers have largely replaced copper wire communications in core networks in many parts of the developed world.[82]

This section describes various types of fiber networks, including a hybrid network solution that utilizes both older copper and newer fiber technology.

Hybrid fiber optic/coax (HFC) - is a telecommunications industry term for a broadband network that combines optical fiber and coaxial cable. Since the early 1990s, cable television operators globally have employed it. The mostly fiber network runs fiber from headends to distribution hubs and optical nodes. Each optical node serves 25 to 2000 premises. For the connection between the optical node and premises served, copper replaces fiber.[83] Because data travels only a portion of its travel distance on copper, these networks can provide more bandwidth than completely copper networks (but less bandwidth than a 100% fiber network) while avoiding the cost of fiber connections to multiple premises.

As the cost of deploying fiber decreases, telecom providers have begun to build new fiber networks where possible to take advantage of fiber's lower operational costs. Therefore, telecom providers are unlikely to build new HFC networks, although they will continue to upgrade existing HFC networks.[84] Because the telecoms are upgrading parts of their networks to fiber to take advantage of fiber's operational efficiencies rather than to meet customer demand for greater bandwidth (which the telecoms claim does not exist), it is unclear if the telecoms will offer customers the high bandwidth of which fiber is capable or if they will "throttle" bandwidth to cable and DSL levels to which customers have become accustomed.

Fiber Networks

As described above, the ratio of fiber to non-fiber transmission materials in a network influences the bandwidth a user obtains from fiber service. In September 2006, the FTTH Councils for Europe, Asia and North America standardized the definitions for different types of fiber networks as described below.[85]

- **Fiber-to-the-Node or Fiber-to-the-Neighborhood (FTTN) -** FTTN is not defined by the FTTH Councils. FTTN refers to a system where fiber is extended to a point - typically a street-side or onpole cabinet - within 1,000 to 5,000 feet of the average user. From there, copper (through a variant of DSL (Digital Subscriber Line)) or wireless serves the user.[86]

  FTTN is different from Hybrid Fiber Coax (HFC), and is used mainly by cable companies to implement Data Over Cable Service Interface Specification (DOCSIS), the standard that allows data to be transmitted over cable TV systems. Each DOCSIS node, is typically served by fiber, with coax extending to users.[87]

- **Fiber-to-the-Curb (FTTC) -** Like FTTN, except that the fiber is brought much closer to user premises - typically closer than 1,000 feet and often closer than 300 feet. In addition to DSL, FTTC installations may use copper cable or wireless Ethernet to bring the signal from the fiber

[81] Matthew DeHaven and Priya Wasnikar, "What' the Fuss About Fiber? A Comparative Analysis of Fiber and Copper Physical Media," *NATOA Journal – Volume 17, Issue 1,* Spring 2009, pg. 13.
[82] Wikipedia: http://en.wikipedia.org/wiki/Fiber-optic_communication (accessed December 2013).
[83] Wikipedia: http://en.wikipedia.org/wiki/Hybrid_fibre-coaxial (accessed December 2013).
[84] "Global Broadband – Fibre is the Infrastructure Required for the Future," Budde Comm, http://www.budde.com.au/Research/Global-Broadband-Fibre-is-the-Infrastructure-Required-for-the-Future.html?r=51 (accessed January 2014).
[85] Truth About Fiber website: http://www.truthaboutfiber.com/article4.cfm (accessed December 2013).
[86] Truth About Fiber website: http://www.truthaboutfiber.com/article2.cfm and http://www.truthaboutfiber.com/article4.cfm (accessed December 2013).
[87] Truth About Fiber website: http://www.truthaboutfiber.com/article2.cfm and http://www.truthaboutfiber.com/article4.cfm (accessed December 2013).

termination point to the user. In rural areas, point-to-point wireless may carry a signal from the roadway to a home that could be a mile or more away.[88]

- **Fiber-to-the-Building (FTTB) -** A fiber-optic communications path that extends from the operator's switching equipment to at least the boundary of the private property enclosing the home(s) or business(es). In this architecture, the optical fiber terminates before reaching the living space or office space. The access path then continues over another access medium - such as copper or wireless - to the subscriber. People in the industry also use other definitions.[89]
- **Fiber-to-the-Home (FTTH) also known as Fiber-to-the-Premise (FTTP) or Fiber-to-Everyplace (FTTx) -** A fiber-optic communications path that extends from the operator's switching equipment to at least the boundary of the living space or office space. The definition excludes architectures in which the optical fiber terminates before reaching the living space or office space and where the access path continues over a physical medium other than optical fiber.[90] Based on experience in the Netherlands, China, Japan, Korea, France, Israel, Switzerland, Norway, and Sweden, there are customers for affordable FTTP networks.[91]

  Although all FTTP networks include a full optical path to the premise, not all FTTP networks are created equal. The optoelectronic conversion, which defines the transmission technology, is positioned in the home (or on the outside wall). The three main architectures are deep PON (DPON), staged PON (SPON), and homerun (or point-to-point). In DPON, a single fiber to a block of homes connects to as many as 64 fibers serving homes. Each endpoint receives the same light from the source, and sends light back through the same single fiber. SPON is a variation in which a single fiber serves a smaller number of homes (typically 8) in the same manner. A homerun architecture (point-to-point) does not split light at all, at least between a home and the aggregation point. Each home gets one or more dedicated fibers all the way from the aggregation point. This option is most expensive and offers the most flexibility in allowing customers to mix and match technology.[92]

  Currently, in home networks use copper, coax, and wireless technology. However, Swisscom's recent investment in optical plastic fiber networks for use inside the home indicates a possible future shift from in home copper to new higher capacity technologies.[93]

  The best fiber can guide light of all possible wavelengths. Each separate wavelength is comparable to the complete "ether" available for all wireless communication. As long as one can modulate the light source and maintain an intact signal through the fiber, one can use the same fiber to deploy various technologies.[94]

While fiber networks clearly offer users and the organizations operating them with multiple benefits as described previously, telecommunications providers have been hesitant to build these networks due to

[88] Truth About Fiber website: http://www.truthaboutfiber.com/article2.cfm and http://www.truthaboutfiber.com/article4.cfm (accessed December 2013).
[89] Truth About Fiber website: http://www.truthaboutfiber.com/article2.cfm and http://www.truthaboutfiber.com/article4.cfm (accessed December 2013).
[90] Truth About Fiber website: http://www.truthaboutfiber.com/article2.cfm and http://www.truthaboutfiber.com/article4.cfm (accessed December 2013).
[91] "Global - Broadband and FttH – Key Statistics and Insights," Budde Comm, http://www.budde.com.au/Research/Global-Broadband-and-FttH-Key-Statistics-and-Insights.html?r=51 (accessed January 2014).
[92] Herman Wagter, "Fiber-to-the-X: the economics of last-mile fiber," *Ars Technica*, March 30, 2010, http://arstechnica.com/tech-policy/2010/03/fiber-its-not-all-created-equal/2/ (accessed February 2014).
[93] Herman Wagter, "Fiber-to-the-X: the economics of last-mile fiber," *Ars Technica*, March 30, 2010, http://arstechnica.com/tech-policy/2010/03/fiber-its-not-all-created-equal/2/ (accessed February 2014).
[94] Herman Wagter, "Fiber-to-the-X: the economics of last-mile fiber," *Ars Technica*, March 30, 2010, http://arstechnica.com/tech-policy/2010/03/fiber-its-not-all-created-equal/2/ (accessed February 2014).

cost. In many locations, especially urban areas, building a fiber network requires digging a trench in the ground and laying fiber in that trench. The presence of existing utilities (telephone, cable, electricity, drinking water, waste water, storm water, gas, and/or oil, etc.) and the lack of knowledge about the exact location of existing utilities due to inadequate record keeping complicate construction projects and increase costs. If the telecoms don't think they will have enough subscribers willing to pay a certain price, then they will not choose to build a fiber network.

For example, in the Netherlands, replacing each copper or coax connection to the home with fiber costs between 850 and 1100 Euro ($1,143-$1,479). According to Verizon, connection costs in the United States are similar. However, fiber's maintenance costs are very low. Verizon estimates that the difference in maintenance costs between a copper line and a fiber line, expressed in a Net Present Value of all future gains at approximately $200 per connection.[95]

Because ISPs can't recover the cost to connect to a premise if customers leave (and some do), most FTTP deployments take more than 10 years to break even.[96] Therefore, it is unlikely that 2 or more fiber connections will be built to the same premise, leading to a stable competitive environment over time unless the ISP's are allowed to divide the market and raise prices to compensate for network underutilization if a customer drops service before it can recoup the cost to bring service to a premise.[97]

Due to the need to recover the cost of bringing service to a premise, the natural tendency in telecommunications is monopoly. Historically, telephone and cable TV firms offered completely separate services over mutually exclusive networks. Providers of each service financed each access network. Because the cost to build a network was steep, the first entrant in a service area operated as a monopoly with high utilization rates.[98] As monopolies, cable and telephone were highly regulated by federal, state, and local government.

However, the more recent discovery of the ability of both telephone and cable lines to deliver internet data and users' willingness to pay for data service provides telephone and cable providers with an opportunity to make more money off their existing networks by providing voice (phone), data, and video (cable TV) services via the internet.[99] Therefore, in many American communities, the cable and telephone operators began to offer internet triple-play (voice, data, video) packages. In many American communities, the result was the replacement of two separate monopolies with a new duopoly regime.

By the time people understood the benefits of fiber compared to older broadband technologies, consumers were used to existing service and telecoms were disinclined to build fiber networks because their legacy networks were profitable.

Because telecoms prefer to build in places that allow faster cost recovery via higher prices and/or more customers, telecoms deploy to wealthier and more urban metro regions and wealthier and more densely populated areas within regions first while delaying deployment to rural and/or low income areas. Absent competition from a new entrant offering better service and/or lower prices (which is unlikely given high deployment costs) or government encouragement to upgrade networks, the deployment of fiber is likely to follow the same pattern that telephone and cable service did during the 19th and 20th centuries.

[95] http://arstechnica.com/tech-policy/2010/03/fiber-its-not-all-created-equal/.
[96] http://arstechnica.com/information-technology/2013/12/500mbps-internet-over-phone-lines-might-solve-fibers-last-mile-problem/.
[97] http://arstechnica.com/tech-policy/2010/03/fiber-its-not-all-created-equal/.
[98] http://arstechnica.com/tech-policy/2010/03/fiber-its-not-all-created-equal/.
[99] http://arstechnica.com/tech-policy/2010/03/fiber-its-not-all-created-equal/.

For communities not served by fiber, which includes the majority of American communities, wireless broadband offers another option for high-speed service. In fact, some broadband experts believe that every community needs a FTTP wireline and a wireless network.[100] Although wireless broadband provides less bandwidth than its wireline counterparts do, wireless speeds and reliability are adequate for many tasks making wireless a viable complement and sometime backup to wireline broadband. The next section outlines wireless internet options.

[100] Rita Stull, "Launching FTTP in JULIET," *NATOA Journal – Volume 17, Issue 1*, Spring 2009, pg. 28.

Wireless Broadband Technologies

Wireless broadband technologies include the following:

Wifi – technology allows electronic devices to exchange data via radio waves over a wireless local area network (WLAN) using products based on the Institute of Electrical Engineers 802.11 standards.[101]

Super wifi – leverages currently unused analog TV spectrum and is characterized by long wavelengths that can travel long distances (1 mile) and penetrate buildings and terrain. Successful use requires 3 free contiguous channels and non-interference with broadcast TV or public safety networks. Current pilot projects are in Houston, TX and in Argentina.

WiMax – or Worldwide Interoperability for Microwave Access is a standards-based technology designed to provide 30 to 40 mbps data transmission rates to enable the delivery of last mile broadband as an alternative to cable and DSL. It uses IEEE 802.16 standards. As of 2011, WiMax may provide up to 1 gbps for fixed stations. WiMax signals can travel greater distances than wifi signals.[102]

Radio – German researchers looking for an alternative to fiber in the hopes of developing a viable means to serve rural areas claim to have achieved 40 gbps wireless transmission over a 1 km + distance using the 240 GHz range. New high-frequency chips were key to achieving these results.[103]

MMDS – or multichannel multipoint distribution system is a wireless communication technology used for broadband networking and as an alternative for cable TV programming reception, especially in rural areas. It uses microwave frequencies at 2.1 GHz and 2.5 to 2.7 GHz. Synonyms are broadband radio service (BRS) and wireless cable.[104]

Satellite – provides up to 18 mbps internet via geostationary satellites and movable ground stations and/or dish antennas mounted at subscribers' premises. Data transmission is via microwave in the 18.3 to 30 GHz range.[105] Although satellite system's movable ground stations often are designed to operate in rugged and remote locations, these are not designed to work while literally in transit.

Mobile Wireless – is the form of internet access used by mobile devices, like cell phones. Typical speeds are 600 kbps to 1.4 mbps.[106] The number of devices using an antenna and a required minimum distance between antennas to avoid interference limits bandwidth.

Personal Cell (pCell) Wireless – a new technology that uses the interference caused by nearby antennas to allow an existing LTE mobile device full access to wireless data bandwidth in an area, regardless of how many other people share the network.[107]

Fixed Wireless – provides wireless networks from 1000 feet to 25 miles; approximate speeds are 512 kbps to 1.5 mbps.[108]

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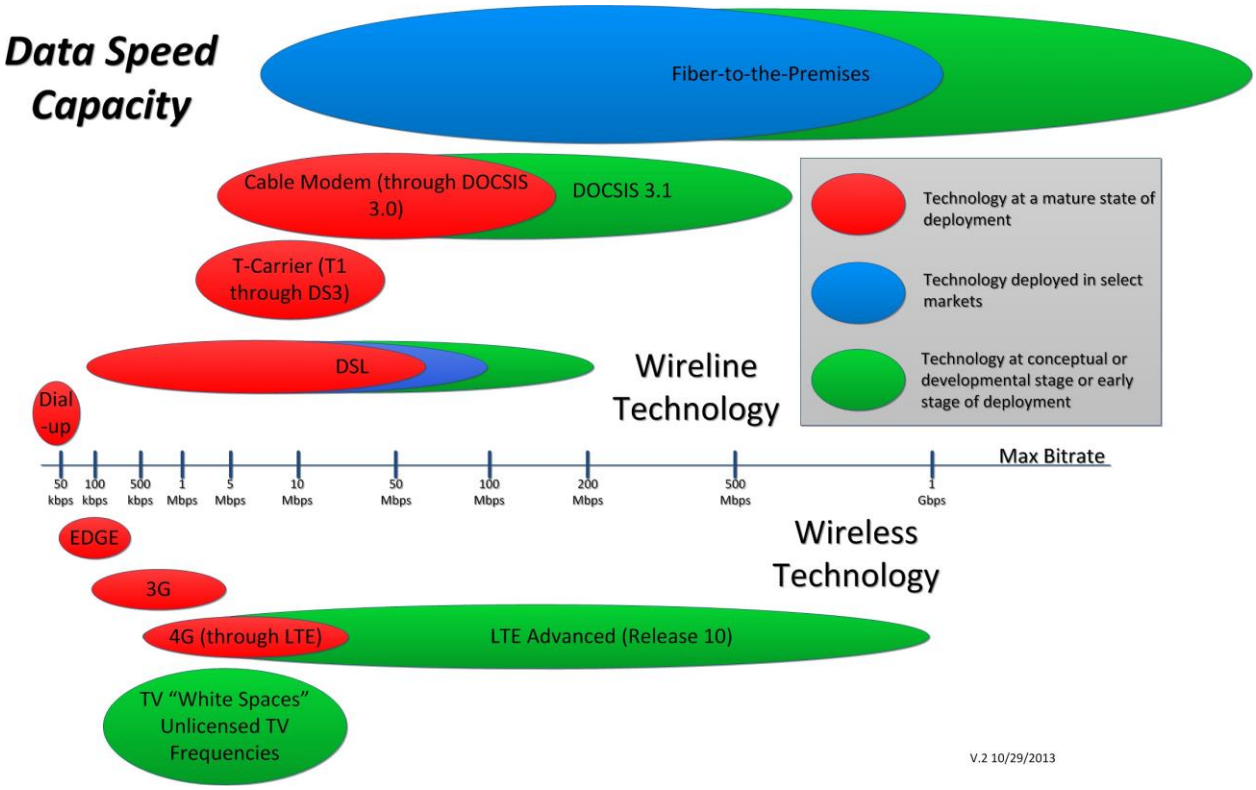
[101] Wikipedia: http://en.wikipedia.org/wiki/Wi-Fi (accessed February 2014).
[102] Wikipedia: https://en.wikipedia.org/wiki/WiMAX (accessed February 2014).
[103] Liam Tung, "40 Gbps speed record broken for wireless broadband," The German View, May 21, 2013.
[104] Wikipedia: http://en.wikipedia.org/wiki/Multichannel_Multipoint_Distribution_Service (accessed February 2014).
[105] Wikipedia: http://en.wikipedia.org/wiki/Satellite_Internet_access.
[106] Second Interim Report Pursuant to State of Washington House Bill 2601, Technology Law and Public Policy Clinic – University of Washington Law School, June 2011, pg. 25.
[107] Nick Wingfield, "Wireless System Could Offer a Private Fast Lane," *New York Times*, February 19, 2014, http://www.nytimes.com/2014/02/19/technology/wireless-system-could-offer-a-private-fast-lane.html?nl=todaysheadlines&emc=edit_th_20140219 (accessed February 2014).
[108] Second Interim Report Pursuant to State of Washington House Bill 2601, Technology Law and Public Policy Clinic – University of Washington Law School, June 2011, pg. 25.

The obvious benefit of wireless technology is that users can access the internet virtually anywhere the technologies are deployed, eliminating the need plug into another device or the wall. However, the quality of wireless transmissions varies because these are affected by:

- The radio frequencies or spectrum used
- The user's proximity to a transmission tower or antenna
- Physical barriers – e.g.) buildings, trees, terrain
- Weather
- The type of wireline connection at the tower or router and the speed of that connection[109]

Thanks to these factors, many wireless technologies offer bandwidth below the 25 mbps threshold for simultaneous transmission of data, voice, and video thereby rendering them less attractive because they cannot support applications for telehealth, interactive distance learning, and video conferencing. The following image[110] shows the bandwidth capacity and maturity of the major types of wireline and wireless broadband technologies.



[109] Ben Lennett, Patrick Lucey, Joanne Hovis, Andrew Afflerbach, Hibah Hussain, and Nick Russo in conjunction with New America's Open Technology Institute and CTC Technology and Energy, "The Art of the Possible: An Overview of Public Broadband Options," pg. 19.
[110] Ben Lennett, Patrick Lucey, Joanne Hovis, Andrew Afflerbach, Hibah Hussain, and Nick Russo in conjunction with New America's Open Technology Institute and CTC Technology and Energy, "The Art of the Possible: An Overview of Public Broadband Options," pg. 14.

Current Broadband Options in New Orleans

Officially, the New Orleans metro area has numerous internet service providers (ISPs). A 2013 internet search for ISPs in New Orleans yielded many telecommunications providers.

However, the internet search results mislead. Many of the ISPs limit service to suburban areas outside the city or to commercial customers, resulting in a dearth of ISP choices for New Orleans residents.

The table below lists the ISPs from the 2013 web search. The table also provides information about the services ISPs offer and whether they serve New Orleans based on subsequent phone calls to the ISPs.

New Orleans Area Internet Service Providers[111]				
Provider	**Services**	**Markets**	**New Orleans Presence**	**Notes**
AccessCom –	Dial Up aDSL – internet only T1 – voice & internet	Commercial – aDSL and T1 Residential – dial up only	Yes	Only offer dialup service to New Orleans residents
AT&T (includes former BellSouth)	**DSL, Mobile, Limited Fiber to the Node**	**Residential, Commercial**	**Yes**	
Century Link	DSL	Residential, Commercial	No	Phone calls to Century Link (855-698-0738) confirm that Century Link does not serve NOLA. Could not confirm if they serve NOLA suburbs.
Charter Communications	Cable	Residential, Commercial	No	Serve Slidell – which is consistent with customer service agent's statement that they serve the fringes of metro areas
Comcast	Cable	Residential, Commercial	No	Serve surrounding municipalities
Cox Communications	**Cable**	**Residential, Commercial**	**Yes**	
EATEL	Fiber	Residential, Commercial	No	Ascension and Livingston Parish
Hughes Net	**Satellite**	**Residential**	**Yes**	
I 55 (aka NTS Communications); includes former X Phone	DSL/Phone and Fiber	Residential, Commercial	No	Offer service in Hammond
Level 3	Ethernet, Voice, Video via dedicated fiber	Commercial	Yes	

[111] New Orleans Internet Service Providers, New Orleans Websites.com (The New Orleans Directory), http://neworleanswebsites.com/cat/te/isp/isp.html, (accessed November 2013 and April 2014).

New Orleans Area Internet Service Providers[111]				
Provider	**Services**	**Markets**	**New Orleans Presence**	**Notes**
MegaPath	Dedicated or undedicated Ethernet over copper (symmetrical and asymmetrical), T1, Cable	Commercial	Yes	
Skycasters	**Satellite**		**Yes**	
Southern Star ISP now Hunt Telecom	Fiber	Commercial only in NOLA	Yes	Information not found on internet during followup research in 2014
Sprint	**Mobile Broadband**	**Residential, Commercial**	**Yes**	
StarBand	**Satellite**		**Yes**	
The Bigeasy Network				Information not found on internet during followup research in 2014
Time Warner Cable			No	ISP did not appear on list of NOLA ISPs during follow-up research in 2014
T-Mobile	**Mobile Broadband**	**Residential, Commercial**	**Yes**	
TW Telecom	Ethernet	Commercial	Yes	Formerly part of Time Warner Cable; now a separate firm.[112]
Verizon	**Mobile Broadband**	**Residential, Commercial**	**Yes**	
WildBlue (parent company ViaSat)	**Satellite**	**Residential**	**Yes**	**Serve the North Shore and Baton Rouge; customer service agent does not recommend satellite for urban areas.**

[112] Contact – Michael Nictakis – 504-620-4820

Residential Market

Based on the available data, it appears that New Orleans residents can choose between 2 wireline providers, 4 mobile providers, and 4 satellite providers. Given their bandwidth limitations and high cost, satellite and mobile are unattractive options leaving wireline as the best choice for home broadband service at the time of the writing of this report in May 2014.

Therefore, like many locations across the United States, New Orleans has a duopoly market for residential broadband. The 2 providers are Cox (a cable provider) and AT&T (a DSL and fiber to the node provider).

Despite repeated attempts, the author was unable to obtain service area maps from AT&T or Cox. This lack of transparency makes it hard to know where the ISPs offer service. Therefore, AT&T and Cox each could have an effective monopoly in parts of New Orleans if their service areas do not always overlap. The ISPs could exploit this type of situation by charging high prices that are too expensive for lower income residents.

For example, in December 2013, Cox's website offered 6 bundled (phone, internet, and cable TV) options in New Orleans. With a 2-year contract, customers could receive promotional prices ranging from $80 to $200 per month, depending on the bundle selected. At the end of the promotion period, prices would increase to $100 to $330 per month. Bandwidth for the $80/$100 per month package was 5 mbps download and 1 mbps upload. Bandwidth for the $200/$330 per month package was 150 mbps download and 20 mbps upload.[113]

As of December 2013, AT&T's website advertised 4 DSL internet only packages with bandwidth ranging from 768 kbps to 6 mbps. Customers were required to sign a 1-year contract and purchase voice services. Prices started at $14.95 per month.[114]

In addition to this service, AT&T also offers a fiber service, called U-verse, in select markets. In December 2013, U-verse promotional pricing ranged from $30 per month for 3 mbps to $65 per month for 45 mbps. Both required a 1-year contract and included a 250 GB limit on data.[115] A web chat with an AT&T customer service agent confirmed U-verse availability at the author's New Orleans address. Unfortunately, the author could not confirm U-verse availability elsewhere in New Orleans. Furthermore, because U-verse uses copper to carry data to the premises in New Orleans, U-verse does not offer New Orleanians the very fast speeds of which fiber is capable.

These Cox and AT&T options compare unfavorably with those offered in other cities in terms of price, bandwidth, and data limits as described in the report, "Broadband Around the World."

As of April 2014, AT&T announced plans to expand U-verse to up to 100 candidate municipalities clustered in approximately 25 metropolitan regions. AT&T's press release touted U-verse's ability to deliver speeds up to 1 gbps. AT&T said it will select cities based on the availability of suitable network facilities and strong investment cases grounded in anticipated demand and receptive policies. AT&T also said it would use the same criteria to determine which areas of a chosen city receive U-verse service.[116]

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[113] Cox website: http://ww2.cox.com/residential/home.cox (accessed December 2013).
[114] AT&T website: http://www.attsavings.com/new-orleans-att-louisiana-internet-deal.html?kbid=36087&gclid=CPn3zK2n2LsCFcZZ7Aod8X4ARg (accessed December 2013.)
[115] AT&T U-verse website: http://www.att.com/u-verse/shop/index.jsp?shopFilterId=500001&ref_from=shop&address_id=&referral_app_id=hardrock#fbid=dsAg4YkpKLA (accessed December 2013).
[116] "AT&T Eyes 100 U.S. Cities and Municipalities for Its Ultra-Fast Fiber Network," Press Release - Wall Street Journal, April 21, 2014, http://online.wsj.com/article/PR-CO-20140421-902775.html.

Likewise, in April 2014, Cox Communications announced plans to deploy gigabit broadband to residential customers. Cox already provides gigabit service to commercial customers via a FTTP network. It is unclear if Cox intends to provide residential gigabit service via fiber as well or to use DOCSIS 3.0/3.1 equipment that the cable industry claims can provide gigabit speed.[117]

Supposedly, these plans from AT&T and Cox could provide more US residents with greater bandwidth. However, AT&T's plan to use of anticipated demand to select which cities and neighborhoods get U-verse likely will mean that certain areas will not get U-verse. Likewise, Cox will limit gigabit service to select cities.

Therefore, while plans by AT&T and Cox may bring higher bandwidth networks closer to some people, others will remain without physical proximity to such networks. Furthermore, the mere presence of a network capable of providing high bandwidth service does not guarantee consumers access to such service. For example, in current U-verse markets, AT&T typically offers only 3 mbps, which is comparable to DSL, rather than the 1 gbps maximum bandwidth it claims U-verse can provide. Clearly, the construction of networks that are theoretically capable of providing greater bandwidth does not necessarily result in greater bandwidth offerings for consumers.

Likewise, if the telecoms offer higher bandwidth services, it is unclear if the price of those options would be greater than, less than, or equal to the prices for current internet options. Given the profit motive, it is likely that telecoms will charge higher prices for their greater bandwidth services, if they choose to offer those.

Absent an increase in competition (i.e. the number of providers in the market), individual telecoms have little incentive to lower prices, even on their lower bandwidth offerings, much less any future higher bandwidth offerings.

Therefore, the likely outcome of recent network improvements is that the telecoms to continue to offer relatively little bandwidth at high prices and add higher bandwidth at higher prices. This outcome will not result in universal access to inexpensive broadband. While affluent people will be able to access faster internet service, low income people will remain priced out. The United States and New Orleans will continue to experience several "digital divides."

Commercial Market

New Orleans' mid-sized and large businesses, which have the ability to pay more money for greater bandwidth, have more broadband options than the City's residents and small businesses. As shown in the previous table, many more ISPs serve the business market than serve the residential market. Furthermore, telecoms focused on the business market often do offer truly high-speed next generation fiber service. However, the high cost makes this service unaffordable to residents and most businesses.

As shown in the table below, fiber services offered to New Orleans businesses cost many thousands of dollars per month. Unfortunately for New Orleans, Level 3's $7800 per month price for 1 gbps fiber[118] service compares very unfavorably with the $51 per month for 2 gbps offered by Tokyo's So-net.[119] So-

[117] Jon Brodkin, "Cox plans gigabit Internet for residential customers this year," Ars Technica, April 30, 2014, http://arstechnica.com/information-technology/2014/04/cox-plans-gigabit-internet-for-residential-customers-this-year/?utm_source=dlvr.it&utm_medium=twitter&utm_campaign=TechL0G&utm_desttype=twitter&utm_destname=techl0g.

[118] Level 3 website: http://diapricing.level3.com/?utm_source=Landing%2bPage&utm_medium=Banner&utm_campaign=22513%2b%22Check%2bAvail%22 (accessed September 19, 2014).

[119] Rick Burgess, "World's fastest Internet arrives in Tokyo: 2Gbps for $50/mo," *Techspot,* April 17, 2013, http://www.techspot.com/news/52275-worlds-fastest-internet-arrives-in-tokyo-2gbps-for-50-mo.html (accessed November 2013).

net's service is affordable to virtually all residents and businesses. Sadly, Level 3's prices limit service to a small segment of the business community and exclude residents.

Naturally, the exact price varies depending on ancillary services purchased, the amount of bandwidth, and the carrier. But, the conclusion remains that fiber service is not affordable for New Orleans residents.

In addition, these prices are not affordable for a large percentage of businesses. At more than $1000 per month, high-speed internet access is only affordable to large businesses and the small share of mid-sized businesses in high-profit or high-revenue industries. At these prices, high-speed internet is unaffordable for virtually all small businesses. No doubt, many small businesses subscribe to the non-fiber services offered to residents to gain access to internet, even if it is not quite high-speed.

Price Quotes for Fiber Services in New Orleans	
Cox[120]	**Level 3**[121]
100 mbps and 5 phone lines - $500 install fee and $2500 per month	Service not quoted
Service not quoted	150 mbps for $3907.92
200 mbps and 5 phone lines - $500 install fee and $3900 per month	200 mbps for $4381.91
250 mbps and 5 phone lines - $500 install fee and $4700 per month	Service not quoted
300 mbps and 5 phone lines - $500 install fee and $5400 per month	300 mbps for $5902.38
Service not quoted	400 mbps for $6354.47
Service not quoted	500 mbps for $644.88
Service not quoted	1000 mbps for $7801.13

The difficulty the author experienced gathering pricing information is one symptom of the lack of transparency in the high-speed internet market. While Level 3 provides price information on its website, the author obtained pricing information from Cox only after calling to request a quote. The need to call multiple providers and request quotes increases the time and effort needed for New Orleans businesses to evaluate their internet options. This situation may persuade some business owners to tolerate services geared to the residential market, even if those services do not meet their needs.

The challenges in the commercial broadband market described in this section no doubt contribute to the unequal broadband access in New Orleans.

[120] Quote prepared by Cox customer service personnel for a proposed business location in the Garden District, September 19, 2014.
[121] Level 3 website:
http://diapricing.level3.com/?utm_source=Landing%2bPage&utm_medium=Banner&utm_campaign=22513%2b%22Check%2bAvail%22
(accessed September 19, 2014).

Past Efforts to Improve Broadband Access

New Orleans Sewerage and Water Board's Proposed CBD Fiber Conduit Network

As part of efforts to upgrade New Orleans' sewer system to comply with a 1998 consent decree, the Sewerage and Water Board of New Orleans (SWB) developed a multi-year program to replace the Central Business District's (CBD) gravity sewer system and simultaneously construct a separate fiber optic conduit network. The proposed project required the use of a high-density polyethylene (HDPE) pipe to pipe-burst to destroy existing sewer pipe and install new pipe and fiber optic conduit simultaneously. As the pipe-bursting head advances and demolishes existing pipe, new sewer pipe with conduit attached by carrot pullers follows immediately behind the pipe bursting head. This method is a proprietary solution developed by Renaissance Integrated Solutions of New Orleans (RISNO).[122]

SWB planned to lease its new conduit to telecommunications firms that wished to pull fiber into the conduit system. SWB hoped it could use the lease fees to mitigate the need for substantial rate increases on the citizens of New Orleans.[123] Project completion, expected in December 2005, never happened due to Hurricane Katrina.

EarthLink

In the years after Hurricane Katrina, as New Orleanians rebuilt the City, EarthLink built a 20 square mile wifi mesh network. It provided free 300 kbps service in the coverage area. 1 mbps upload/download service cost $22 per month. In addition, EarthLink offered hourly and daily service options for occasional users. EarthLink also allowed other ISPs to offer service over its network.[124]

In May 2008, EarthLink terminated its wifi networks in New Orleans, Corpus Christi, TX, and Milpitas, CA. In June 2008, EarthLink terminated its Philadelphia wifi network.[125] EarthLink transferred the Corpus Christi and Milpitas networks to these municipalities.[126] The Philadelphia network underwent a circuitous path to eventual municipal ownership in subsequent years as summarized in the companion report, "Broadband Around the World."

EarthLink was unable to sell its New Orleans network to another ISP or transfer it to the City or a third party, so the network ceased operations. At that time, EarthLink continued to offer dial-up and wireline broadband service and indicated that wifi subscribers could switch.[127]

New Orleanians present during the time that EarthLink's network was active, described the free and subscription wifi services as too slow. Subscription rates for the paid service and resulting revenue were insufficient from EarthLink's perspective, leading to their decision to end service. EarthLink's experiences underscore the importance of providing a product/service that meets customer needs at an affordable price that allows the provider to make an acceptable profit.

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[122] Joe Becker, Sal Mansour, Wendy Lundeen, and Stephen Paletta, "New Orleans to Bridge the Last Mile with Dual Purpose Rehabilitation," presented at NASTT Conference, Orlando, FL, April 24 – 27, pg. 1.
[123] Joe Becker, Sal Mansour, Wendy Lundeen, and Stephen Paletta, "New Orleans to Bridge the Last Mile with Dual Purpose Rehabilitation," presented at NASTT Conference, Orlando, FL, April 24 – 27, pg. 2.
[124] "EarthLink Launches the City of New Orleans Municipal Wireless Network," http://www.prnewswire.com/news-releases/earthlink-launches-the-city-of-new-orleans-municipal-wireless-network-57218847.html (accessed December 2013).
[125] Eric Null "Municipal Broadband: History's Guide," *I/S: A Journal of Law and Policy for the Information Society*, pg. 41.
[126] "EarthLink To Shut Down New Orleans' Municipal Wi-Fi," http://www.informationweek.com/mobility/muni-wireless/earthlink-to-shut-down-new-orleans-munic/207402189 (accessed December 2013).
[127] "EarthLink To Shut Down New Orleans' Municipal Wi-Fi," http://www.informationweek.com/mobility/muni-wireless/earthlink-to-shut-down-new-orleans-munic/207402189 (accessed December 2013).

In 2008, when EarthLink's networks ceased operations, most people did not have wireless devices because these were expensive to buy and use. Therefore, demand for wireless service was low. Consequently, broadband providers focused on wireline because most people accessed the internet with wired devices. However, the rapid adoption of mobile devices since 2008 increased demand for mobile broadband; thus, mobile broadband must be an important part of a viable broadband strategy.

Defining Broadband Access and Adoption

Any meaningful discussion of broadband access and adoption must acknowledge the complex interplay of several related factors that affect access and adoption as discussed below.

Availability or deployment –is the physical presence of an internet service provider's network equipment that connects to the worldwide network of connected computers. In an ideal world, wireline and wireless broadband would be ubiquitously available so that individuals and organizations could access broadband at home, work, libraries, community centers, and other public locations.

The internet service provider's financial considerations often limit its ability to install equipment to all potential users. In many instances, the equipment is not available in an area due to an actual or perceived lack of customers (potential revenue) sufficient to justify the costs to build. Alternatively, cable and DSL broadband may be available, but the service is too slow to meet current user needs.

Affordability – Potential users must be able to pay for broadband networking equipment from the internet service provider and personal computing equipment (e.g. desktop, laptop, tablet computers, and smartphones/personal digital assistants) to connect with the ISP's equipment. In addition to these one-time charges, potential users also must be able to pay monthly subscription fees.

Digital literacy skills – Potential users must have the general and digital literacy skills to be able to use equipment to connect to the internet and conduct activities.

- **Applications and content** – The internet must provide easy to use applications and content relevant to potential users' needs.
- **Accessibility** - In addition, users with various disabilities (e.g. people with blindness or low vision, deafness or hard of hearing, other physical disabilities, and/or developmental disabilities) may need additional hardware and/or software to enable them to perform the same tasks on the internet as other people. Application and content developers should consider this fact when developing new products and services to provide internet access for these individuals.

Subscription - If these conditions are met, a person or organization may contract with an internet service provider to obtain internet service.

Use / Adoption – True adoption happens when the internet subscriber uses his/her equipment and the internet service provider's equipment to connect to internet to gather information and communicate with others in pursuit of personal, professional, and/or organizational goals. Because it is possible to subscribe to internet without maximizing its potential, one must distinguish between mere subscription and true adoption. True adoption requires effort from outside content providers as well as the subscriber and his/her internet service provider.

In addition, barriers to subscription and adoption are also attitudinal or emotional. People may feel that the content and applications on the internet are not relevant to them or they may fear that they will not be able to navigate the internet successfully.

Differential Broadband Access

Introduction

This section provides an overview of broadband access (and its individual components – physical availability, affordability/price, subscription rates, and level of comfort in use) internationally, in the United States, in Louisiana, and in New Orleans.

Please note that it is extremely difficult to find current, reliable data for the components of broadband access. Understandably, broadband providers are skittish about sharing information about networks and number of subscribers that their competitors could use, making it difficult to obtain their data. Likewise, firms that collect data for the telecom industry charge large sums of money for data, making it unaffordable for many municipalities.

Consequently, this analysis relies upon free data available via internet from sources such as the United States Census Bureau or the Federal Communications Commission. Some the data is several years old. Because broadband has become so integral to modern life, many people adopted broadband during the past few years. This situation increases the likelihood that broadband adoption rates from 2010 to 2012 have changed slightly by the time of the writing of this report in 2014.

Therefore, readers should view these data as a "snapshot" of conditions in particular locations at a certain point in time. Taken together, the data provide evidence of differential broadband adoption rates in various locations and by different segments of the population. While the exact numbers may change, the relative differences in broadband adoption likely have not changed. Consequently, readers should view the information presented in this section as evidence of differential broadband adoption between:

- The United States and other countries
- Different regions and cities within the United States
- Different parishes within the New Orleans metro region
- Different socio-economic groups within New Orleans

If the City of New Orleans were to pursue options to improve broadband access, such as devising ways to encourage telecoms to offer affordable data packages for low income residents, the City would need to obtain better data and perform a detailed analysis of the broadband adoption for the City. For now, this data will suffice to provide an overview of broadband adoption within New Orleans and a comparison of broadband adoption in New Orleans and in other cities.

Broadband Internationally

Recognizing that telecommunications technologies are no longer luxuries but vital necessities for 21st century life, more than 120 countries have created broadband policies. These policies differ because each responds to unique political, social, economic, financial, and geographic factors in its nation. However, each policy recognizes that broadband infrastructure is essential to address their nation's social and economic challenges.[128]

In countries where the government played an active role in implementing a national broadband policy, residents and businesses benefit from high bandwidth broadband at affordable prices.

[128] "Global Broadband – Fibre is the Infrastructure Required for the Future," Budde Comm, http://www.budde.com.au/Research/Global-Broadband-Fibre-is-the-Infrastructure-Required-for-the-Future.html?r=51 (accessed January 2014).

For example, many international cities offer greater bandwidth than New Orleans at lower prices. In Tokyo, customers can get 2 gbps download and 1 gbps upload service for approximately $51 per month from private firms.[129] The small town of Olds in Alberta, Canada offers service on its community owned fiber network for $57 to $90 per month.[130] Seoul, South Korea boasts average broadband speeds of 100 to 300 mbps[131] while Singapore's telecoms offer 1 gbps service.[132] Each place took a different approach to improving broadband access, but the result is affordable, high bandwidth broadband.

With the availability of fast broadband at reasonable prices, many international locations have very high broadband subscription rates. For example, in Singapore, the broadband household penetration rate is 104%.[133] Because Singaporeans are literate and digitally literate, they utilize the internet to complete personal and professional tasks. These places represent an ideal toward which other cities can aspire. The report, "Broadband Around the World," highlights the experiences of several international and American cities to improve broadband access in their communities.

Broadband in the United States: 2010 to Present

Physical Availability of Broadband

The Census Bureau's July 2011 Current Population Survey found that 98% of U.S. households had physical access to a home broadband connection.[134] However, not all broadband connections are equal. In fact, most U.S. households have access to connections that barely meet the Federal Communication's Commission's inadequate definition of broadband. Furthermore, thanks to the monopoly or duopoly market in most regions, many U.S. households have a choice of 3 or fewer internet service providers.

As per the Federal Communications Commission, in December 2012, most US households had access to 3 or fewer providers offering at least 6 mbps download and 1.5 mbps upload as described below.

- 27% of census tracts had 1 provider offering 6 mbps upload/1.5 mbps download
- 37% of census tracts had 2 providers offering 6 mbps upload/1.5 mbps download
- 34% of census tracts had 3 or more providers offering 6 mbps upload/1.5 mbps download[135]

Subsequent National Telecommunications and Information Administration (NTIA) research confirms both the wide availability of service that meets a minimum definition of broadband and the relative absence of truly high-speed broadband for most Americans. For example, a chart showing the percent of the US population with access to wireline broadband at home by bandwidth revealed that:

- Almost 100% of the US population has access to wireline broadband service with a maximum download speed of 768 kbps[136] (which is akin to obsolete dial-up service and insufficient to perform many tasks online)

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[129] Jacob Kastrenakes, "Japanese internet provider offers twice the speed of Google Fiber for less money," *The Verge*, April 15, 2013, 12:27 PM, http://www.theverge.com/2013/4/15/4226428/sony-so-net-2gbps-download-internet-tokyo-japan (accessed November 2013).
[130] Emily Chung, "Small Alberta town gets massive 1,000 Mbps broadband boost," *CBC News*, July 18, 2013, http://www.cbc.ca/news/technology/small-alberta-town-gets-massive-1-000-mbps-broadband-boost-1.1382428 (accessed November 2013).
[131] Darrell N. West, "Technology Lessons from Seoul, South Korea," *Brookings*, September 8, 2010, http://www.brookings.edu/research/opinions/2010/09/08-technology-west (accessed October 2013).
[132] Wikipedia: http://en.wikipedia.org/wiki/Internet_in_Singapore (accessed November 2013).
[133] Wikipedia: http://en.wikipedia.org/wiki/Internet_in_Singapore (accessed November 2013).
[134] Kathryn Zickuhr and Aaron Smith, "Home Broadband 2013," Pew Research Center, August 26, 2013, pg. 6.
[135] "Internet Access Services: Status on December 31, 2012," Federal Communications Commission – Industry Analysis and Technology Division Wireline Competition Bureau, December 2013, pg. 9.
[136] "Broadband Statistics Report," Graph, Any Technology, National Telecommunications and Information Administration, July 2014.

- Less than 10% of the US population has access to wireline broadband service with a maximum download speed of 1 gbps[137] (which is akin to the service offered in many Asian and European cities and the bare minimum US cities and users need to remain competitive with their peers)

Other NTIA data revealed that most of the 2013 US population derived its wireline broadband access from cable and DSL while a much lower share of the population had access to fiber. At the 10 mbps download level, the percentages of households with access by technology are:

- Cable: 86% of households with access
- Fiber: 24% of households with access
- DSL: 56% of households with access
- Fixed wireless: 23% of households with access[138]

At the 50 mbps download level, the percentages of households with access by technology are:

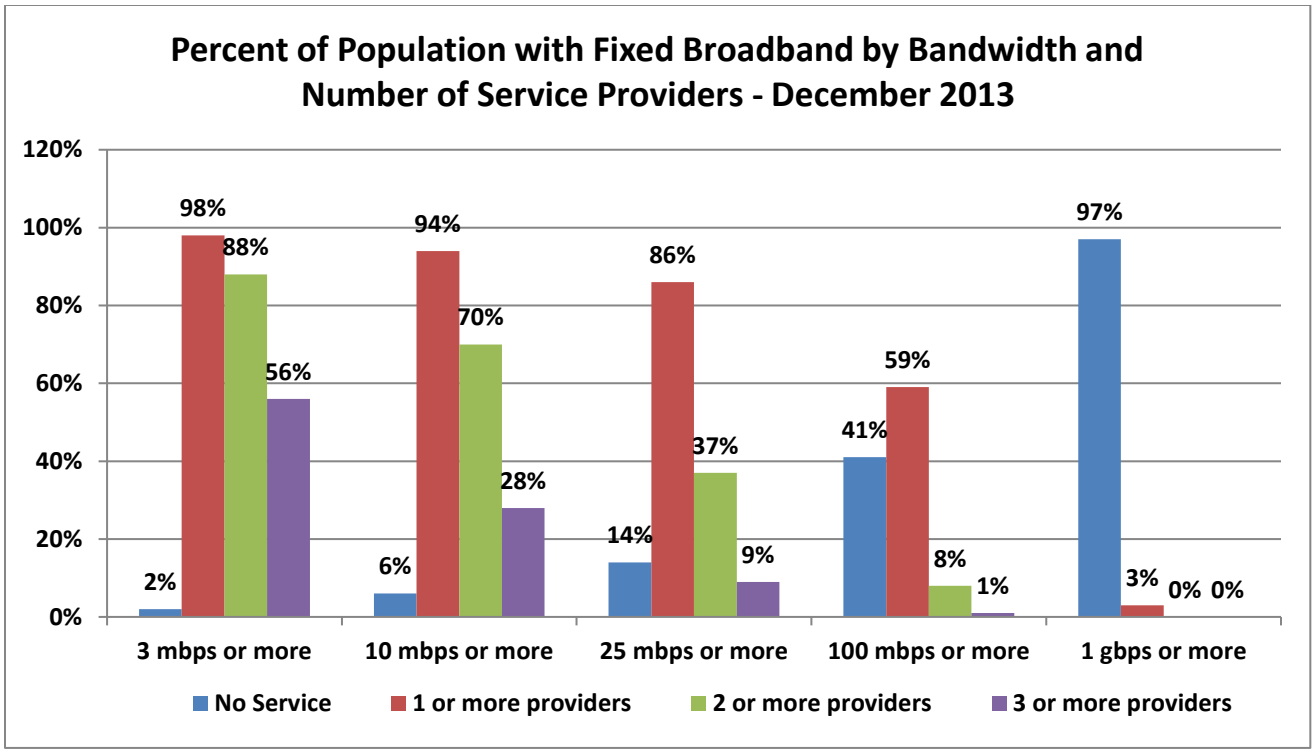
- Cable: 80% of households with access
- Fiber: 22% of households with access
- DSL: 1% of households with access
- Fixed wireless: 6% of households with access[139]

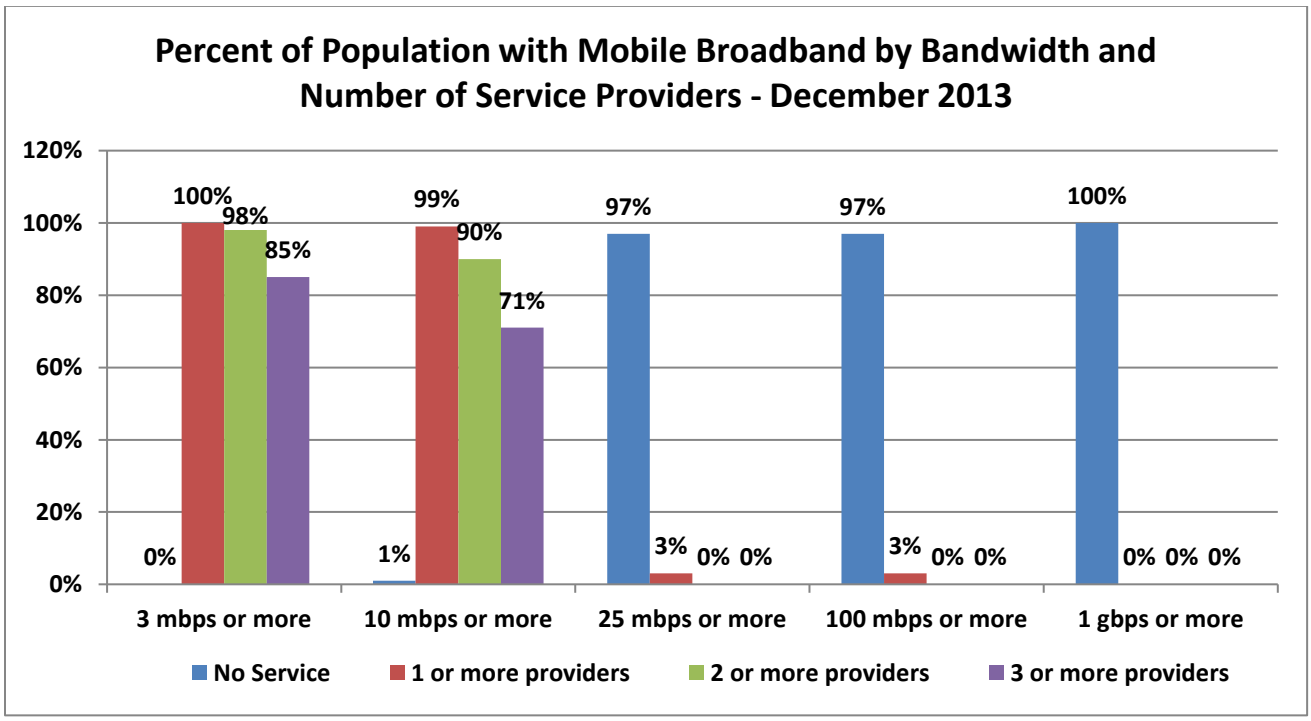
Therefore, at higher bandwidths, U.S. residents had access to fewer broadband technology options, thereby limiting their choices for service.

Furthermore, at higher bandwidths (i.e. faster download and upload speeds), U.S residents had access to few internet service providers , which can allow the internet service provider to charge higher prices while reducing service product quality, variety, service, and/or innovation.[140]

The next two tables[141] highlight the fact that U.S. residents have fewer ISP options from which to choose when they attempt to purchase higher bandwidth services. At the 1 gbps bandwidth comparable to international cities, 97% of Americans have no option for wireline broadband and the 3% have one option available. No U.S. residents have more than 1 option at the 1 gbps level. At bandwidth greater than 25 mbps, most U.S. residents have no options for mobile broadband.

[137] "Broadband Statistics Report," Graph, Any Technology, National Telecommunications and Information Administration, July 2014.
[138] "Broadband reaching more than ever," Speedmatters, July 19, 2014, http://www.speedmatters.org/blog/archive/broadband-reaching-more-than-ever/?utm_medium=email&utm_source=speedmatters&utm_campaign=20140721WeeklyUpdate.
[139] "Broadband reaching more than ever," Speedmatters, July 19, 2014, http://www.speedmatters.org/blog/archive/broadband-reaching-more-than-ever/?utm_medium=email&utm_source=speedmatters&utm_campaign=20140721WeeklyUpdate.
[140] David N. Beede, "Competition Among U.S. Broadband Service Providers," Office of the Chief Economist Issue Brief #01-14, U.S. Department of Commerce, December 2014, Executive Summary, pg. 1.
[141] David N. Beede, "Competition Among U.S. Broadband Service Providers," Office of the Chief Economist Issue Brief #01-14, U.S. Department of Commerce, December 2014, pg. 4 and 5.


Percent of Population with Fixed Broadband by Bandwidth and Number of Service Providers - December 2013
120%
100%
80%
60%
40%
20%
0%
98%
88%
56%
94%
70%
28%
86%
37%
9%
59%
41%
8%
1%
97%
3%
0%
0%
2%
6%
14%
3 mbps or more
10 mbps or more
25 mbps or more
100 mbps or more
1 gbps or more
No Service
1 or more providers
2 or more providers
3 or more providers


Percent of Population with Mobile Broadband by Bandwidth and Number of Service Providers - December 2013
120%
100%
80%
60%
40%
20%
0%
100%
98%
85%
99%
90%
71%
97%
97%
100%
3%
0%
0%
0%
1%
3%
0%
0%
0%
0%
0%
0%
3 mbps or more
10 mbps or more
25 mbps or more
100 mbps or more
1 gbps or more
No Service
1 or more providers
2 or more providers
3 or more providers

Internet Use

Because people without broadband service near their home often access the internet at school, work, libraries, community centers, friends' homes, and other locations, the percentage of Americans using internet exceeds the percentage of Americans with broadband service available near their homes and the percentage of American households with broadband subscriptions at their homes. The trends for broadband use in the United States are encouraging. US internet users include:

- 87% of adults
- 99% of people in households earning more than $75K per year
- 97% of adults aged 18 to 29
- 97% of adults with college degrees[142]

Furthermore, most Americans recognize the value of the internet with 76% saying that the internet is good for society and 90% saying that the internet is good for them personally.[143] Contrastingly, in 1995, 42% of US adults had not heard of the internet and 21% knew it was associated with computers.[144]

Subscription to Broadband Technology

In the United States, broadband subscription at home lags physical access to broadband and broadband use by a large margin. In 2010, approximately 68% of American households had broadband at home; another 3% of American households had home dial-up internet. Therefore, in 2010, 71% of American households had home internet.[145] Of the 68% of households with home broadband access, most subscribed to cable or DSL service. Mobile, fiber, and satellite accounted for a smaller share of broadband connections.[146]

US residents continue to acquire home broadband access. By May of 2013, the percent of Americans with home broadband access appeared to have increased slightly to 70%.[147]

Between 2008 and 2012, the number of residential internet connections in the United States increased significantly. The number of residential connections with more than 200 kbps bandwidth in at least one direction more than doubled from 88,190,000 in 2008 to 215,441,000 in 2012 due to dramatic increases in mobile wireless connections. Between 2008 and 2012, the number of residential mobile wireless connections increased approximately 600% from 19,142,000 to 131,019,000.[148]

Consistent with the trend of a rapidly increasing number of residential mobile wireless connections, AT&T's Project VIP includes the construction of approximately 40,000 new small cell sites and 10,000 cell towers between 2013 and 2015 to help handle the increase in mobile traffic.[149]

Contrastingly, the number of fixed wireline connections increased only 22% from 69,047,000 to 84,421,000 between 2008 and 2012. Within the wireline connection category, most of the connections were cable or DSL. Broadband over power line, satellite, fixed wireless, and FTTP represented a small

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[142] Susannah Fox and Lee Rainie, "The Web at 25 in the U.S.," Pew Research Center, February 27, 2014, pg. 5 (report available at http://www.pewinternet.org.
[143] Susannah Fox and Lee Rainie, "The Web at 25 in the U.S.," Pew Research Center, February 27, 2014, pg. 5 (report available at http://www.pewinternet.org.
[144] Susannah Fox and Lee Rainie, "The Web at 25 in the U.S.," Pew Research Center, February 27, 2014, pg. 10 (report available at http://www.pewinternet.org.
[145] "Exploring the Digital Nation: Computer and Internet Use at Home," U.S. Dept. of Commerce, Nov. 2011, pg. 1.
[146] "Exploring the Digital Nation: Computer and Internet Use at Home," U.S. Dept. of Commerce, Nov. 2011, pg. 5.
[147] Kathryn Zickuhr and Aaron Smith, "Home Broadband 2013," Pew Research Center, August 26, 2013, pg. 2.
[148] "Internet Access Services: Status on December 31, 2012," Federal Communications Commission – Industry Analysis and Technology Division Wireline Competition Bureau, December 2013, pg. 24.
[149] Brian Mefford, "Asset Mapping Catalyzes Broadband Development," *Broadband Communities*, November/December 2013, pg. 100.

share of wireline connections although the number of fiber residential connections did increase significantly from 2,717,000 to 6,265,000 from 2008 to 2012. Between 2008 and 2012, fiber's share of residential wireline connections grew from 3.2% to 7.4%.[150] The table below shows residential internet connections using data from the Federal Communications Commission's Form 477, Part 1.

US Residential Connections more than 200 kbps in at Least One Direction by Technology: 2008-2012 (In thousands)[151]

Technology	2008	2009		2010		2011		2012	
	Dec.	June	Dec.	June	Dec.	June	Dec.	June	Dec.
Total	88,190	103,300	117,089	132,567	149,441	171,773	186,709	196,702	215,441
Fixed Wireline	69,047	71,509	73,394	75,251	76,918	78,906	80,716	82,236	84,421
aDSL	26,488	27,047	27,402	27,488	27,467	27,754	27,767	27,652	27,426
sDSL	74	71	85	65	53	52	54	49	50
Other Wireline[1]	47	49	56	61	76	45	40	14	35
Cable Modem	38,681	39,909	40,872	42,178	43,295	44,480	45,832	47,033	48,719
FTTP[2]	2,717	3,348	3,758	4,185	4,704	5,118	5,521	5,892	6,265
Satellite	630	668	767	787	811	885	886	998	1,242
Fixed Wireless	410	417	454	486	513	572	616	599	683
Mobile Wireless	19,142	31,791	43,695	57,316	72,523	92,867	105,993	114,466	131,019

1. Power Line and Other are summarized with Other Wireline to maintain firm confidentiality.
2. Fiber to the premises.
Note: The FCC revised some historical data. Figures may not sum to totals due to rounding.

There are many reasons for the continued dominance of current generation broadband technologies, cable and DSL, and the slow introduction of next generation broadband technology, fiber. Because US residents grudgingly accept the price and bandwidth combinations telecoms offer for cable and DSL (as demonstrated by their continued purchase of these services) and because these price and bandwidth combinations provide adequate profit to the telecoms, telecoms are reluctant to undertake the risk and expense of deploying a fiber network in territory they already serve or the even more significant risk of initiating service in another telecom's territory.

The high cost of building a network means that most ISPs require at least 30% of the market to recover their costs. Because incumbents can lock customers into long-term contracts at low prices, a new competitor may fail before it acquires enough customers to become financially sustainable.[152]

Thanks to these daunting financial realities, telecoms have carefully deployed their networks to limit overlap in service areas and restrict competition. In many regions, although multiple telecom providers serve the area, most customers have only 1 or 2 providers who offer service to their residence.

As of 2013, fiber's main drawbacks are its limited geographic range and high cost to deploy. Because cable and DSL offer greater bandwidth at relatively low prices compared to other internet options, most consumers choose cable or DSL. Cable and DSL are faster than wireless options and more available than fiber. The high cost of installing and operating a network discourages providers from offering service in markets with incumbent providers. The lack of competition keeps cable and DSL customers dependent

[150] "Internet Access Services: Status on December 31, 2012," Federal Communications Commission – Industry Analysis and Technology Division Wireline Competition Bureau, December 2013, pg. 24, 28.
[151] "Internet Access Services: Status on December 31, 2012," Federal Communications Commission – Industry Analysis and Technology Division Wireline Competition Bureau, December 2013, pg. 24.
[152] Christopher Mitchell, "Community Owned Networks Benefit Everyone," *NATOA Journal – Volume 17, Issue 1,* Spring 2009, pg. 31.

on their providers and allows those providers to charge high prices.[153] This situation allows most Americans to muddle along with barely acceptable internet service that is rapidly becoming obsolete.[154]

A lack of ISP investment in new wireline broadband infrastructure between 2006 and 2012 may have limited the supply of affordable broadband in the United States. Between 1996 and 2012, ISP's annual investment in broadband infrastructure increased from $55 B to $68 B. Annual investment peaked in 2000 at $118 B, then declined to $57 B in 2003 and increased slowly since that time.[155]

From 1996 to 2011, the amount of money invested in wireline broadband annually decreased; the amount of money invested in wireless and cable broadband increased; and total broadband investment increased slightly as shown in the next table.[156] More recently, between 2008 and 2011, investment in wireline and cable infrastructure declined slightly in spite of the fact that subscription to those services is still increasing. Furthermore, despite the fact that the total amount of money invested in broadband increased slightly between 2002 and 2012, the percent of revenue that ISPs invested in capital expenditures declined during this period for each of the following telecoms: AT&T, Timer Warner Cable, Verizon, and Comcast.[157] Taken together, the evidence suggests that cable and wireline providers are content to add more customers to existing networks without making significant improvements.

Annual Infrastructure Investment by US Broadband Providers (Billions $) – 1996 to 2011[158]

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Total	55	65	72	92	118	111	72	57	58	62	70	70	71	64	67	67
Wireline	39	45	51	66	79	68	34	27	25	26	30	32	32	28	27	26
Wireless	11	13	15	16	24	27	23	19	22	25	28	23	24	23	27	28
Cable	6	7	6	11	15	16	15	11	10	11	12	15	15	13	13	13

Many Americans are unaware of the bandwidth differential between ubiquitous cable and DSL networks and rarely available fiber networks. According telecom experts, "The difference between 100 mbps and 5-10 mbps is not simply the ability to receive more data faster. It is … an economically crucial difference that [profoundly alters] how the medium is used. In Japan, [an academic] study of the effects of widespread near-symmetric 100 mbps (as opposed to the passive, receiving-only model that dominates in the US and elsewhere), found a dramatic increase in the use of peer-to-peer applications … as well as in the number of ….users who take advantage of such applications." With greater bandwidth, people become content creators who generate more economic impact than mere content users.[159]

[153] Second Interim Report Pursuant to State of Washington House Bill 2601, Technology Law and Public Policy Clinic – University of Washington Law School, June 2011, pg. 26.
[154] Second Interim Report Pursuant to State of Washington House Bill 2601, Technology Law and Public Policy Clinic – University of Washington Law School, June 2011, pg. 27.
[155] Patrick Brogan, "Updated Capital Spending Data Show Rising Broadband Investment in Nation's Information Infrastructure," US Telecom Research Brief, November 4, 2013.
[156] Patrick Brogan, "Updated Capital Spending Data Show Rising Broadband Investment in Nation's Information Infrastructure," US Telecom Research Brief, November 4, 2013.
[157] Brian Fung, "ISPs are spending less on their networks as they make more money off them," Washington Post, http://www.washingtonpost.com/blogs/the-switch/wp/2014/07/24/isps-are-spending-less-on-their-networks-as-they-make-more-money-off-them/, July 24, 2014.
[158] Patrick Brogan, "Updated Capital Spending Data Show Rising Broadband Investment in Nation's Information Infrastructure," US Telecom Research Brief, November 4, 2013.
[159] Jim Baller and Casey Lide, "The Case for Public Fiber-to-the-User Systems," March 4, 2006, pp. 9-10.

Therefore, the prevalence of slow, asynchronous broadband in the United States hurts individuals and the economy. Because this situation is unlikely to change, government intervention may be necessary to encourage telecom providers to offer better service at lower cost to more people.[160]

Racial and Socioeconomic Disparities in Home Broadband Subscription

Although 68% of American households subscribed to broadband in 2010, only 43% of American households earning less than $25,000 annually subscribed.[161] For households earning less than $20,000 per year, 33% do not go online and another 33% go online, but lack internet service at home.[162] The data reveal a clear discrepancy in broadband subscription by household income.

Survey data reveal other discrepancies. Regardless of income or residence in urban or rural areas, Whites are more likely to subscribe to home broadband service than Blacks or Hispanics. Likewise, urbanites are more likely to subscribe to broadband than rural dwellers regardless of income. Poorer households have lower broadband subscription rates than wealthier households regardless of race.

Scholars refer to these differences in broadband subscription as a "digital divide." The table demonstrates an urban/rural digital divide, a have more/have less digital divide, and a White/Black/Hispanic digital divide.

	Household Broadband Subscription by Income, Urban/Rural Status, and Race/Ethnicity[163]			
	Household Income Less Than $25K / year		**Household Income More Than $75K / year**	
	Urban	**Rural**	**Urban**	**Rural**
White	49%	36%	92%	85%
Black	39%	32%	84%	81%
Hispanic	38%	30%	88%	76%

The next table demonstrates that overall broadband subscription rates for Whites and Asians exceed the national average while overall broadband subscription rates for Blacks and Hispanics lag the national average when ignoring income and urban/rural location.

	Percent with home broadband[164]
Asian	81%
White	72%
All	**68%**
Hispanic	57%
Black	55%

However, racial and ethnic minorities' lower home broadband subscription rates do not indicate lesser interest in telecommunications services. Telecommunications industry market research from the late 1990s indicated that race and ethnicity impact interest in and ownership of *existing* technology. However, race and ethnicity did not affect interest in *future* technology. No racial or ethnic differences were apparent for interest in high-speed phone lines, internet usage, or satellite TV [the new

[160] Second Interim Report Pursuant to State of Washington House Bill 2601, Technology Law and Public Policy Clinic – University of Washington Law School, June 2011, pg. 27.
[161] "Eighth Broadband Progress Report," Federal Communications Commission, August 21, 2012, pg. 106.
[162] "Home Internet still eludes low-income Americans," *Speed Matters*, January 28, 2014, http://www.speedmatters.org/blog/archive/home-internet-still-eludes-low-income-americans/?utm_medium=email&utm_source=speedmatters&utm_campaign=20140203BlogUpdate#.UvAAYZbz8-M (accessed February 2014).
[163] "Exploring the Digital Nation: Computer and Internet Use at Home," U.S. Dept. of Commerce, Nov. 2011, pg. 25.
[164] "Exploring the Digital Nation: Computer and Internet Use at Home," U.S. Dept. of Commerce, Nov. 2011, pp. 15, 16.

technologies of the 1990s].[165] Minorities' interest in subscribing to new technologies in the future may represent their aspirations to participate more fully in society in the future as their circumstances improve. If so, minorities may represent an opportunity for ISPs to expand their customer base.

In addition, only 43% of households headed by someone with a disability had home broadband access while 72% of households led by a non-disabled person had access to broadband internet in 2010[166] providing evidence of a digital divide between people with disabilities and those without disabilities.

The California Emerging Technology Fund's research revealed that people without home broadband internet were more likely to be over 65, have an annual household income less than $35,000, lack a high-school degree, reside in a rural area, have minimal or no English proficiency skills, and have one or more disabilities.[167] This research confirms the existence of several "digital divides."

Stated Reasons for Lack of Home Broadband Subscription

The most important reasons for not subscribing to broadband service were:

- Lack of need or interest - 47%
- Lack of affordability - 24%
- Lack of access to an adequate computer - 15%[168]

Households reporting lack of affordability as a major barrier noted the following costs: purchasing a computer, internet service installation, and the recurring monthly subscription.[169]

Households headed by Blacks or Hispanics were less likely to own a computer (35% and 33% with no computer, respectively) than households headed by Whites or Asians (20% and 14% with no computer, respectively). The lack of a computer likely contributes to the lower broadband subscription rates.

Broadband Access Away From Home

Of the 68% of Americans with home broadband in 2010, most could access internet outside the home, too. In 2010, 43% of Americans with home broadband also had internet access outside the home while 25% of Americans with home broadband access did not have internet access outside the home. As previously mentioned, 3% of Americans had dial-up internet at home in 2010. Another 9% had internet access away from home, but not at home. The remaining 20% of people did not use the internet.[170]

While people with home broadband subscriptions also accessed the internet at work and school, they rarely used libraries or another person's home to access the internet. On the other hand, people without broadband at home often accessed the internet at work, school, public libraries, and someone else's home.[171] However, their dependence on the goodwill of others for internet access limits the amount of time they access the internet, which affects activities they pursue on the internet. Research indicates that people with a home broadband connection engage in more activities than people who rely on access from work, a friend's house, or a phone.[172]

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[165] "Consumer Demand for Broadband Services: xDSL, Cable Modems, and Wireless 1998-2003," Market Research Report, Insight Corporation, http://www.insight-corp.com/reports/broad.asp.
[166] "Exploring the Digital Nation: Computer and Internet Use at Home," U.S. Dept. of Commerce, Nov. 2011, pp. 15, 16.
[167] Ana Alicia Bradshaw, "Filling in the Broadband Gaps," CETF presentation.
[168] "Exploring the Digital Nation: Computer and Internet Use at Home," U.S. Dept. of Commerce, Nov. 2011, pp. vi, 2.
[169] "Exploring the Digital Nation: Computer and Internet Use at Home," U.S. Dept. of Commerce, Nov. 2011, pp. vi, 2.
[170] "Exploring the Digital Nation: Computer and Internet Use at Home," U.S. Dept. of Commerce, Nov. 2011, pg. 38.
[171] "Exploring the Digital Nation: Computer and Internet Use at Home," U.S. Dept. of Commerce, Nov. 2011, pg. 39.
[172] Jesse Washington, "For Minorities, A New Digital Divide," *Diverse Issues in Higher Education*, Associated Press, January 2011, http://diverseeducation.com/article/14592/ (accessed March 2014).

While Americans lag residents of other nations in broadband subscription rates, the situation is dire for Americans who are low income, racial/ethnic minorities, or who have disabilities as discussed previously. As the United States attempts to close the broadband subscription gap between itself and other nations, it must address broadband subscription disparities between different groups of people within the United States, as well.

Smartphones and Broadband Access

Although smartphones do not offer the same utility as a broadband connected computer because certain tasks are more difficult to perform on a smartphone, such devices offer internet access. Therefore, these devices complement broadband connected computers for many people and function as a substitute for others.

With regard to phone service, it takes approximately 20 to 25 more seconds for a 911 dispatcher to determine a caller's location if the caller used a cell phone rather than a landline. Furthermore, because the location data arrives as latitude - longitude coordinates, rather than as an exact address as with landlines, there is always some uncertainty about where to send emergency services.[173] The extra time to determine cell phone 911 callers' locations and the uncertainty of these locations could delay emergency services arrival on scene and result in loss of life or more serious injury. Due to cell phones' limitations as alternatives for landline phones and broadband connected computers, these devices are subpar substitutes rather than equally useful replacements for the older technologies.

However, some Americans rely upon smartphones for their internet access despite these drawbacks. As of 2013, 56% of US adults owned a smartphone.[174] Of the 80% of US residents with a broadband connection, a smartphone, or both, the breakdown is as follows:

- 46% - both home broadband connection and a smartphone
- 24% - home broadband connection only
- 10% - smartphone only[175]

The remaining 20% of US residents had neither a home broadband connection, nor a smartphone in 2013[176] – the same share as in 2010.

[173] "Cellphones not yet a substitute for landlines," *Speed Matters*, January 28, 2014, http://www.speedmatters.org/blog/archive/cellphones-not-yet-a-substitute-for-landlines/?utm_medium=email&utm_source=speedmatters&utm_campaign=20140203BlogUpdate#.UvAGfJbz8-M (accessed February 2014).
[174] Kathryn Zickuhr and Aaron Smith, "Home Broadband 2013," Pew Research Center, August 26, 2013, pg. 4.
[175] Kathryn Zickuhr and Aaron Smith, "Home Broadband 2013," Pew Research Center, August 26, 2013, pg. 4.
[176] Kathryn Zickuhr and Aaron Smith, "Home Broadband 2013," Pew Research Center, August 26, 2013, pg. 4.

Broadband in Louisiana: 2010 to Present

Home broadband subscription in Louisiana lags home broadband subscription in the United States. Approximately 61% of Louisiana households subscribed to broadband in 2010[177] compared with 68% nationally. In 2010, broadband subscription in Louisiana's urban areas was slightly better than the statewide value with approximately 62.5% of urban households subscribing.[178]

Sadly, Louisiana residents with home broadband likely have slow service that does not meet the FCC target speed of at least 4 mbps download. Louisiana's bandwidth breakdown is:

- 45% - 4 mbps or less
- 25% - 4 to 10 mbps
- 28% - 10 to 25 mbps
- 2% -more than 25 mbps[179]

Because so many Louisiana residents have slow download speeds, the statewide average is 5.2 mbps. While this compares favorably to the United States average of 3 mbps, it is unimpressive compared to global leader South Korea's average download speed of 34 mbps.[180]

In summation, although more than half of Louisianans have home broadband, their download speeds fail to meet the minimum standard, which itself is significantly less than actual speeds in other nations. Upload speeds are often slower.

Louisianans with home internet connections differ in their satisfaction with their internet service. A survey of Louisianans in selected parishes found that the share of people who were very satisfied with their internet varied dramatically by type of technology as shown below.

- Dial-Up -26% very satisfied
- Cable/DSL - 51% very satisfied
- Wireless - 58% very satisfied
- Satellite - 38% very satisfied
- Cellular - 51% very satisfied[181]

These scores suggest that Louisiana residents know that their internet service is subpar.

When asked why they did not have broadband at home, Louisianans with dial-up or no internet service cited the "expense of internet connection or inability to pay" as the top reason for not having broadband service. Among respondents without home broadband, 42% cited lack of affordability as a major reason; another 17% cited unaffordability as a minor reason.[182] Among survey respondents without broadband who said that they will not subscribe to broadband, 61% said expense/inability to pay was a major reason for their hesitancy to subscribe to broadband. Another 9% cited expense/inability to pay as a minor reason for unwillingness to subscribe to broadband in the future.[183]

The evidence suggests that Louisianans are less likely to have home broadband than are residents in other states; Louisianans with home broadband are likely to have slower speeds than people in other

[177] "Exploring the Digital Nation: Computer and Internet Use at Home," U.S. Dept. of Commerce, Nov. 2011, pg. 49.
[178] "Exploring the Digital Nation: Computer and Internet Use at Home," U.S. Dept. of Commerce, Nov. 2011, pg. 53.
[179] LA Fact Sheet – Speed Matters: A Project of Communications Workers of America – www.speedmatters.org.
[180] LA Fact Sheet – Speed Matters: A Project of Communications Workers of America – www.speedmatters.org.
[181] Kirby Goidel and Michael Climek, "Broadband Use and Access Survey Report," Louisiana State University, 2009, pg. 12.
[182] Kirby Goidel and Michael Climek, "Broadband Use and Access Survey Report," Louisiana State University, 2009, pg. 17.
[183] Kirby Goidel and Michael Climek, "Broadband Use and Access Survey Report," Louisiana State University, 2009, pg. 22.

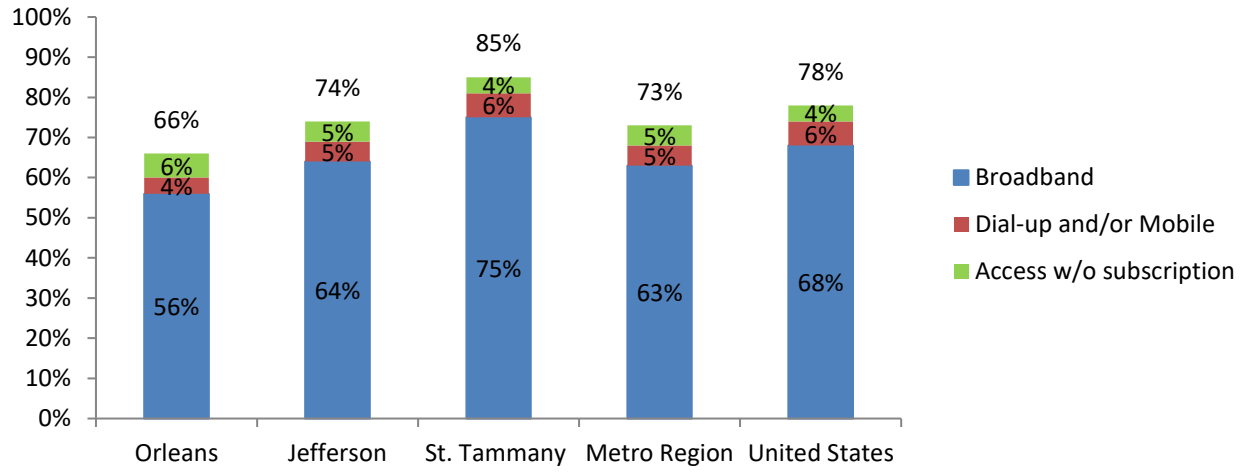
locations are; and many Louisianans are dissatisfied with their service. These facts suggest that Louisianans are at a disadvantage for home broadband compared to peers in other locations.

Broadband in New Orleans: 2010 - Present

Many New Orleans residents, businesses, and non-profit organizations lack access to adequate broadband needed to perform personal, professional, and/or civic-involvement tasks. When they cannot complete tasks due to inadequate broadband access, productivity and the achievement of outcomes suffer as described previously. This section describes broadband availability in New Orleans in terms of physical access, subscription rates, and available bandwidth as evidence that New Orleans broadband situation is dire enough to justify government involvement in planning the city's broadband future.

As shown below, in 2013, New Orleans households were less likely to have internet access than households in the surrounding parishes. Furthermore, household internet access in New Orleans lagged household internet access in the United States as a whole.

Household Internet Access, 2013 [182]



Note: Access without a subscription refers to those who receive free internet from their housing environment (e.g. college dorms).

[184] The Data Center analysis of US Census Bureau data from American Community Survey 2013 (http://www.datacenterresearch.org/data-resources/who-lives-in-new-orleans-now/) accessed October 16, 2014.

Physical Availability of Broadband

In Orleans Parish (which shares the same geographic boundaries as the City of New Orleans), in 2011, 4,151 people in a population of 360,740 (or 1%) did not have broadband near their residences.[185]

For the 99% of New Orleanians with broadband near their homes, most lived in areas with two options – cable and DSL. In 2011, broadband availability for New Orleanians was:

- Cable - 96%
- DSL - 97%
- Fixed wireline - 0%
- Fiber – 0%[186]

Hence, most areas of the city and most residents had access to both cable and DSL. Only a small percentage of residents had access to one type of wireline broadband or no wireline broadband. DSL and cable access in New Orleans compare favorably with the United States as a whole. In 2012, 90% of US residents had DSL access at home while 88% had cable access at home.[187]

In 2011, no area of the city had fiber service available. Since then, AT&T deployed U-Verse, its fiber-to-the-node network, to parts of the city as discussed previously in this report. With maximum bandwidth of 45 mbps, U-verse does not approach fiber's maximum bandwidth. However, 45 mbps exceeds the bandwidth of competing cable and DSL options in New Orleans in December 2013.

In addition to cable and DSL, all of New Orleans has mobile broadband access.[188] Therefore, broadband internet is physically available for the overwhelming majority of New Orleanians. The Louisiana Broadband Initiative offers an interactive map where Louisianans can view the types of broadband available in their communities at http://www.broadband.la.gov/mapping.asp.

Broadband Subscription

However, in New Orleans, broadband subscription lags physical broadband availability by a considerable margin. Many low income residents do not subscribe to broadband or any type of internet consistent with national trends described previously.

In 2010, only 43% of American households earning less than $25,000 per year had home internet available.[189] With Orleans Parish's 2010 per capita income at $24,929,[190] many New Orleanians earn less than $25,000 per year. In fact, roughly half of New Orleans residents earn less than $35,000 per year.[191] Thus, on both an individual level and household basis, many people in New Orleans earn small incomes, putting them at risk for not being able to subscribe to broadband because they cannot afford it.

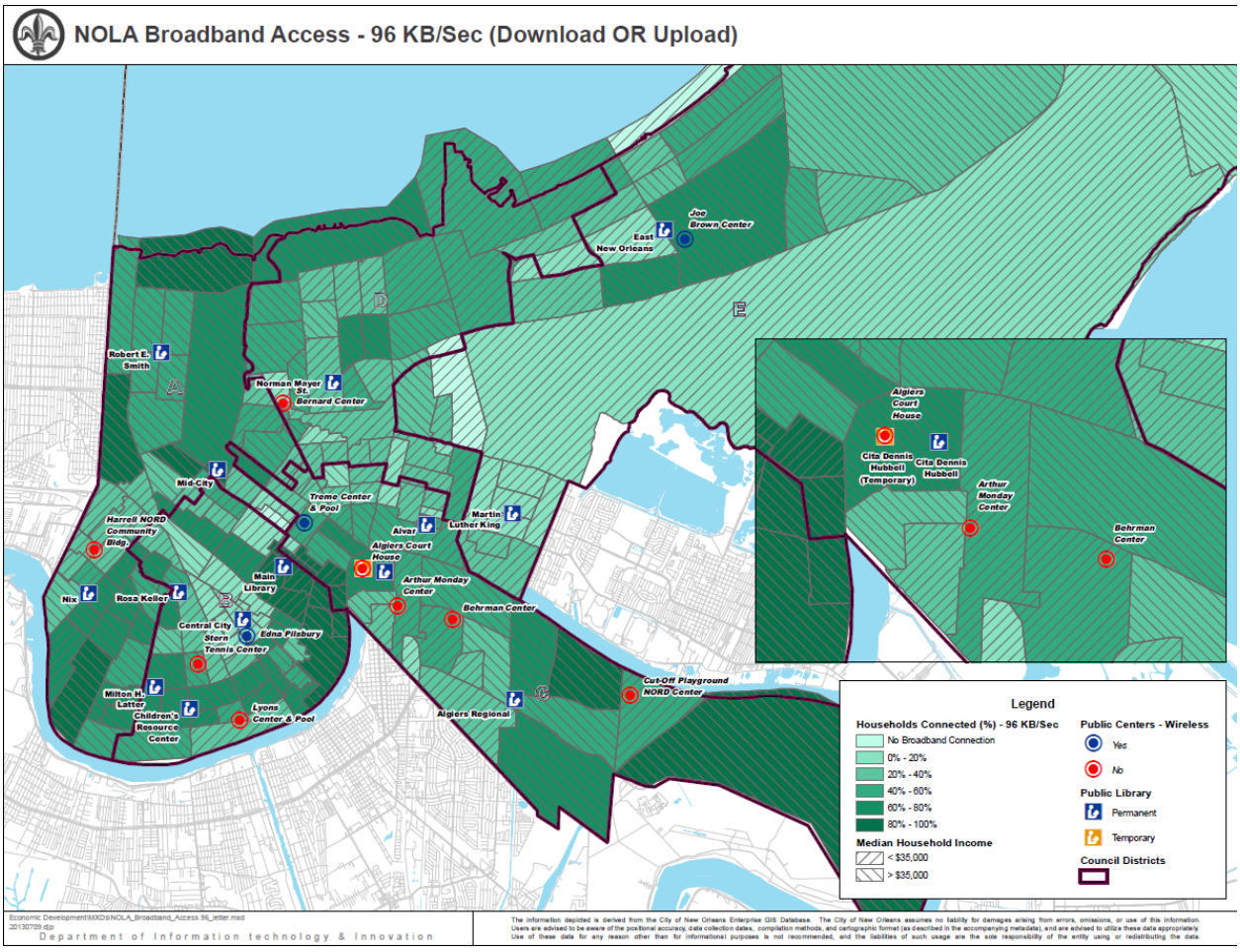
Data about New Orleans broadband subscription support this claim. Using FCC data, the figure below compares estimated 2010 broadband subscription percent ranges with median household income by census tract for minimum bandwidth of 768 kbps download and 200 kbps upload.[192] In 2010:

[185] "Eighth Broadband Progress Report," Federal Communications Commission, August 21, 2012, pg. 106.
[186] National Broadband Map Data, Federal Communications Commission, June 2011.
[187] "Head of the Class: Broadband in the United States," presentation at NCSL Spring Forum, May 3, 2013, Advanced Communications Law & Policy Institute at New York Law School, pg. 3.
[188] National Broadband Map Data, Federal Communications Commission, June 2011.
[189] "Eighth Broadband Progress Report," Federal Communications Commission, released August 21, 2012, pg. 106.
[190] "Eighth Broadband Progress Report," Federal Communications Commission, released August 21, 2012, pg. 106.
[191] Tracie Powell, "How the digital divide developed in New Orleans & what it means for the future of news there," pointer.org, July 5, 2012 (accessed September 2013).
[192] FCC website: http://transition.fcc.gov/wcb/iatd/comp.html (accessed October 2013).

- Areas with median annual household income less than $35,000 generally had lower broadband subscription rates than areas with median annual household income greater than $35,000
- In many parts of New Orleans, only 21% to 40% or 41% to 60% of households subscribed to broadband internet[193]

The overall subscription rate for Orleans Parish (which is contiguous with the City of New Orleans) is 40% to 60%. This compares poorly to metropolitan counties nationwide where broadband subscription rates average in the 60% to 80% range.[194]

Furthermore, in New Orleans, racial and ethnic minorities populate many of the low broadband subscription areas and areas with median annual household income less than $35,000. Thus, this figure is a graphic demonstration of the fact that poor minorities in New Orleans are less likely to subscribe to broadband than wealthier whites are. This finding is consistent with national trends.[195] The fact that many Louisianans (and Americans) cite unaffordability as the reason they do not have broadband manifests itself in the differential subscription rates shown in the figure.

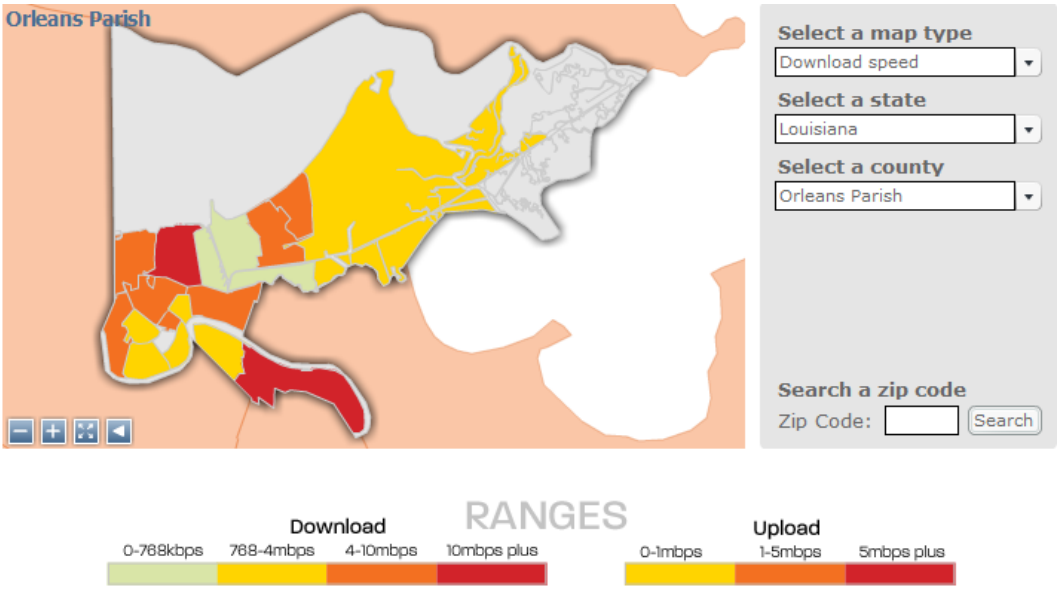


[193] FCC website: http://transition.fcc.gov/wcb/iatd/comp.html (accessed October 2013).
[194] Matt Davis, "Poorer communities continue to suffer lack of broadband access – and related opportunity," *The Lens*, May 24, 2012, http://thelensnola.org/2012/05/24/broadband-acces/ (accessed January 2014).
[195] Matt Davis, "Poorer communities continue to suffer lack of broadband access – and related opportunity," *The Lens*, May 24, 2012, http://thelensnola.org/2012/05/24/broadband-acces/ (accessed January 2014).

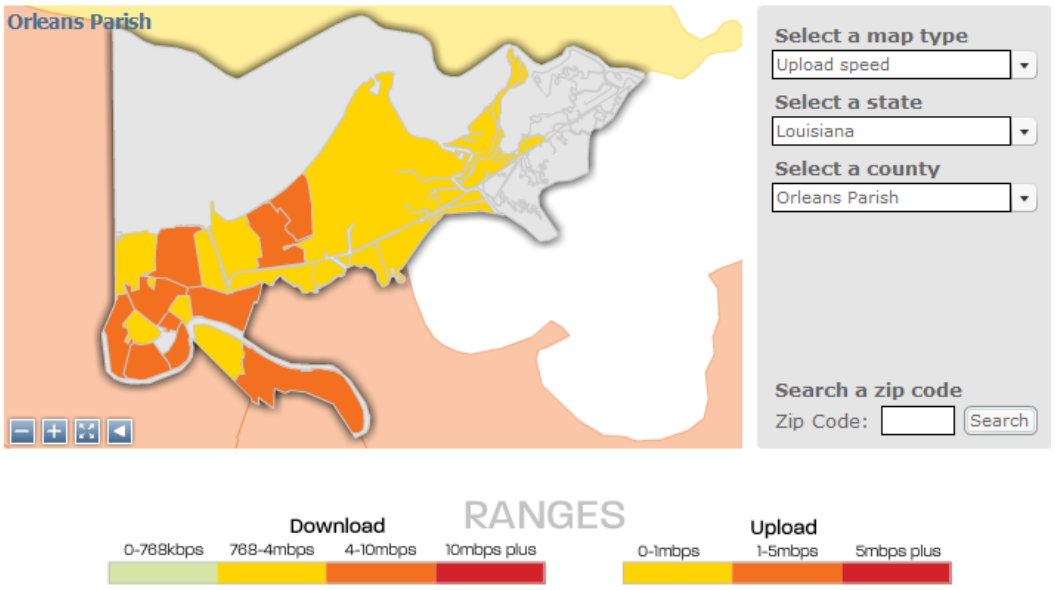
Broadband Bandwidth

As with Louisianans, New Orleans residents with internet access experience inadequate download bandwidth. For example, in 2010, in many areas of the City, average bandwidth was less than the FCC target of 4 mbps download. However, in other sections of the City, average bandwidth was greater than 10 mbps download.

Consistent with national and state patterns, upload bandwidth in 2010 was even worse. For example, all areas of the City had upload bandwidth of less than 5 mbps.[196]



Data Source: LA Internet Speed Results – http://www.speedmatters.org/content/states/category/louisiana (accessed August 2013).



[196] LA Internet Speed Results – http://www.speedmatters.org/content/states/category/louisiana (accessed August 2013).

Data Source: LA Internet Speed Results – http://www.speedmatters.org/content/states/category/louisiana (accessed August 2013).

As discussed at the beginning of the preceding section, the difficulty in finding current, reliable, and affordable data on broadband access forced the author to rely upon free data available on the internet. The age of the data and rapidly changing broadband adoption mean that readers should view data as evidence of differential broadband adoption in various locations and broadband adoption trends over time rather than as a definitive description of broadband adoption in 2014. Consequently, before initiating any efforts to improve broadband access, the City should obtain better data to perform any analyses required at that time.

Causes of Differential Broadband Adoption

Introduction

Many elements contribute to differential broadband adoption rates or the "digital divide." A variety of individual and systemic, direct and indirect, supply side and demand side factors interact to affect broadband adoption.

For example, two individuals may lack home broadband for completely different reasons. One person may decide not to subscribe to broadband that is widely available in his/her neighborhood. Another person may not have broadband because internet service providers do not serve his/her neighborhood. In these examples, the first person chooses not to have broadband, but the second person lacks broadband due to systemic factors in the broadband market.

To carry this example further, a person may choose not have broadband because s/he cannot read or use computers. The person's lack of knowledge may result from a poor education in subpar schools. Therefore, systemic factors like poor schools often influence seemingly individual factors such as choosing not to have broadband internet. The remainder of this section discusses some factors affecting broadband adoption and the interplay between those factors.

Direct Factors

The most obvious direct factor affecting broadband adoption is the ***availability*** of broadband (supply side). If broadband is not physically present, people cannot subscribe to it. In New Orleans, cable and DSL broadband is physically available to almost all residents (and fiber-to-the-node is presumably available to an unspecified share of the population) as discussed in prior sections. Because broadband is physically available for most New Orleanians, this report concludes that physical availability of broadband is not the major factor affecting broadband adoption in New Orleans.

Another factor affecting broadband adoption is ***affordability***. People who cannot afford or believe they cannot afford broadband (or the devices needed to access broadband) are unlikely to subscribe. Affordability is a function of both the prices that internet service providers charge (supply side) and the amount of money available to consumers to spend (demand side). As discussed previously, lack of affordability is the main factor affecting broadband adoption in Louisiana and throughout the United States. Evidence suggests affordability is a factor impeding broadband subscription in New Orleans, too.

A third factor affecting broadband adoption is consumers' ***ability to use the internet***. A lack of general and digital literacy may prevent some people from using the internet. Individuals who cannot read well or who are not comfortable using computers, tablets, and smartphones may not be able to use the internet. Therefore, they may not subscribe to broadband to avoid spending money for a product they cannot use. A lack of general and digital literacy is a demand-side factor affecting broadband adoption.

Supply Side Contributing Factors

Many underlying issues contribute to the direct factors discussed above. These underlying issues are the supply side and demand side contributing factors that impact broadband adoption. This section discusses *supply side* examples of market failure and market interference while the next section concentrates on demand side factors contributing to differential broadband adoption.

Market Failure in Rural Areas

Typically, for-profit entities avoid markets where they would not earn desired profits. With broadband, this decision often results in lesser or no service to certain categories of people and geographic areas. For example, rural areas frequently receive lesser or no broadband service. According to North Carolina Democratic state legislator Bill Faison, who was heavily involved in opposing telecom industry efforts to limit the ability of North Carolina municipalities to provide broadband in their communities, major companies are only interested in installing networks where they can guarantee 167 customers a mile.[197] Achieving a certain density of subscribers allows the telecom providers to spread the cost of infrastructure installation across an adequate number of paying customers.

However, because not everyone in an area will subscribe to broadband, enrolling 167 customers per mile may require the presence of twice as many residents per mile or more. Because private sector telecom providers pursue a target profit within a certain timeframe, this situation results in economically rational decisions not to provide service in areas of lower population density. Unfortunately, such decisions by telecom providers leave people in rural areas without access to badly needed broadband. In this instance, the market fails people in rural areas.

On the other hand, according to Mr. Faison, municipalities can provide broadband to customers in rural areas for as few as 3 to 6 customers per mile.[198] Indeed, some rural Canadian and American municipalities are able to provide broadband directly to residents and businesses as discussed in the report, "Broadband Around the World." Although New Orleans is an urban area, some of the lessons learned in rural areas may be transferable to New Orleans.

Market Failure to Serve Low Income People

As discussed in previous sections, research indicates that broadband subscription varies significantly by income. Typically, low income people are less likely to subscribe to broadband and frequently cite lack of affordability as a reason why they do not have broadband.

It is unclear if the ISP's failure to provide services that are affordable to lower income households is because they willfully ignore the needs of such households or because they accidentally overlook these people when designing and pricing service.

Market Failure in Urban Areas

Urban areas frequently are dense enough to provide ISPs with at least 167 potential customers per mile. However, the greater cost of equipment installation in urban areas may result in ISPs increasing the targeted number of subscribers. Furthermore, due to actual or perceived unaffordability of broadband services, low-income urban residents are less likely to subscribe to broadband service. The combination of increased installation costs and fewer expected subscribers may dissuade telecoms from providing service to low-income urban areas. When internet service providers do serve these areas, the firms tend to offer lower bandwidth options.

Existing ISPs are confident that the expense of building a new system and securing customers will deter competitors from entering the broadband market. Therefore, most ISPs operate in an environment with little or no competition from other ISPs.

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[197] Matt Davis, "Poorer communities continue to suffer lack of broadband access – and related opportunity," *The Lens*, May 24, 2012, http://thelensnola.org/2012/05/24/broadband-acces/ (accessed January 2014).
[198] Matt Davis, "Poorer communities continue to suffer lack of broadband access – and related opportunity," *The Lens*, May 24, 2012, http://thelensnola.org/2012/05/24/broadband-acces/ (accessed January 2014).

Once broadband providers achieve a monopoly or duopoly in an area, they frequently offer low bandwidth and/or unreliable service that are unaffordable for many lower income people and excessive by international standards. The low quality of the service dissuades many residents from subscribing and the low number of subscribers dissuades internet service providers from improving their products.

Even when internet service providers do not have a monopoly or duopoly in an area, there is always a possibility that competitors will merge, decreasing the number of providers, in an attempt to move toward a monopoly or duopoly system.

For example, in 2011, AT&T wanted to buy T-Mobile. The proposed merger would have reduced the number of major mobile broadband providers in the United States from 4 to 3. The Justice Department blocked the proposed merger saying that the merger would result in higher prices, fewer choices, and lower quality products and was therefore a violation of federal antitrust laws.[199][200]

In 2013, Comcast proposed to buy Time Warner Cable. The combined cable company would have controlled 30% of the pay TV market and 33% of the broadband market in the United States. The combined company also would have controlled 20 of the top 25 cable markets.[201]

In the recent past, the United States had more than 40 cable providers. As of May 2014, the FCC and the Justice Department were considering another merger that would reduce the number of major cable providers from 4 to 3, thereby resulting in the same impact on number of cable providers as the blocked merger of AT&T and T-Mobile would have had on the wireless market.

Even though the FCC and the Justice Department have blocked recently proposed mergers, the distribution of subscribers among major telecoms shows how concentrated the broadband market is. As the table below shows, the top broadband providers serve approximately 86.6 M subscribers with about 51.2 M electing cable while the other 35.4 M receive broadband from telephone companies.[202]

Distribution of Subscribers among Major Internet Service Providers (ISPs)[203]

ISP	Type	Number of Subscribers
Comcast	cable	21 million
Time Warner	cable	12 million
Charter	cable	4 million
AT&T	telephone	16 million
Verizon	telephone	9 million
CenturyLink	telephone	6 million

[199] Brad Hooker, "Justice Department Stalls Plans of Political Giant AT&T," *Open Secrets – Center for Responsive Politics*, August 31, 2011, http://www.opensecrets.org/lobby/index.php.
[200] Chris Velazco, "The AT&T/T-Mobile Merger Is Dead," *Tech Crunch*, December 19, 2012, http://techcrunch.com/2011/12/19/att-tmobile-merger-dead/.
[201] Tod Newcombe, "Comcast-Time Warner Merger Would Hurt Municipal Broadband," Governing, May 12, 2014, http://www.governing.com/topics/transportation-infrastructure/gov-comcast-time-warner-merger-concerns.html.
[201] Fiona Morgan, "Cities fight bill to limit broadband," *Indy Week*, June 6, 2007, http://www.indyweek.com/indyweek/cities-fight-bill-to-limit-broadband/Content?oid=1202258.
[202] "Handful of telecoms, cable companies dominate broadband," Speedmatters, November 22, 2014, http://www.speedmatters.org/blog/archive/handful-of-telecoms-cable-companies-dominate-broadband/?utm_medium=email&utm_source=speedmatters&utm_campaign=20141124WeeklyUpdate.
[203] "Handful of telecoms, cable companies dominate broadband," Speedmatters, November 22, 2014, http://www.speedmatters.org/blog/archive/handful-of-telecoms-cable-companies-dominate-broadband/?utm_medium=email&utm_source=speedmatters&utm_campaign=20141124WeeklyUpdate.

Other Examples of Market Failure

In recent years, large carriers in California, New York, New Jersey, and Washington, DC, have not maintained their copper lines. Instead, these carriers moved voice only customers from copper lines to IP services without following established procedures for customer notice and consent. Copper lines are regulated as a utility while IP services are not regulated. Therefore, telcos benefit by moving customers from regulated copper to non-regulated IP services. Tellingly, carriers are not obligated to serve everyone or maintain their IP communications infrastructure.[204] By moving customers from voice to IP service, telcos can drop unprofitable services regardless of customer need for the services.

For example, Verizon failed to repair copper lines when requested and moved customers in New York City and the Catskills region north of the city from copper lines to VoiceLink without disclosing VoiceLink's limitations.[205] Unlike copper telephone lines, VoiceLink cannot provide many services some customers need, including: fax, ATM, DVR, credit card processing, medical alert, deaf relay, DSL, dial-up modem, or monitored home security services. Furthermore, unlike copper lines, Voice Link requires back up power.[206]

Verizon also told some customers that they had to upgrade to fiber to get phone service or that they could not order standalone telephone service. Undoubtedly, some customers paid for unwanted services to maintain phone service while other customers did without phone service because they could not afford to buy a "triple-play" package.[207] In the meantime, Verizon benefitted by transferring these customers from a regulated network to an unregulated network.

At a time when broadband internet has become a modern necessity and most US residents have abandoned slow dial-up internet via copper lines for broadband internet and are beginning to demand faster (greater bandwidth) broadband, Verizon is moving customers to a technology that allows fewer services than copper, which itself is obsolete. At a time when we need to move forward, some telecoms actually are moving backward. The Communications Workers of America (CWA), whose members are the telecoms' rank-and-file staff, recognize the absurdity of this situation. The CWA published a flyer warning customers about VoiceLink's limitations as described above.

In this instance, the market failed to protect Verizon's customers from its less than admirable conduct. Other telecoms also have attempted to move customers into unregulated services. Misinformation about available products, failure to maintain infrastructure, and switching customers to new services are examples of telecom activities that affect customers (urban and rural, rich and poor) when the market does not enforce fair business practices.

Telecommunications Services Providers - Lobbying Activities

Internet service providers often use paid lobbyists to promote the passage and retention of laws that promote their interests and the rejection of laws that threaten their interests, often to the detriment of consumers. During 2013, interested parties spent approximately $2.38 B on 11,935 lobbyists to discuss

[204] Igonzalez, "Verizon Engaged in IP Transition With No Rules: Where is the FCC?," Community Broadband Networks, June 16, 2014, http://muninetworks.org/content/verizon-engaged-ip-transition-no-rules-where-fcc.
[205] Igonzalez, "Verizon Engaged in IP Transition With No Rules: Where is the FCC?," Community Broadband Networks, June 16, 2014, http://muninetworks.org/content/verizon-engaged-ip-transition-no-rules-where-fcc.
[206] "Beware of Verizon's Voice Link" flyer from the Communications Workers of America, http://cwafiles.org/District9/images/2013/BewareofVZVoiceLink%20FINAL.pdf (accessed June 24, 2014).
[207] Igonzalez, "Verizon Engaged in IP Transition With No Rules: Where is the FCC?," Community Broadband Networks, June 16, 2014, http://muninetworks.org/content/verizon-engaged-ip-transition-no-rules-where-fcc.

their concerns with at the federal level.[208] Of this total, 605 firms in the communications and electronics sector spent $288 M on 1,932 lobbyists.[209]

The table below lists the 6 telecom organizations and firms that are among 2013's Top 20 purchasers of lobbying services and the amount they spent on lobbying Congress and federal agencies that year.

Telecommunications Firms in the Top 20 for Lobbying to Congress - 2013[210]	
Firm / Organization	**2013 Spend on Lobbying**
Comcast Corporation	$13,950,000
National Cable and Telecommunications Association	$13,270,000
AT&T, Inc.	$12,300,000
Google Inc.	$11,460,000
National Association of Broadcasters	$10,650,000
Verizon Communications	$10,143,000

During the 113th Congress, Comcast lobbied on 43 bills;[211] Verizon lobbied on 64 bills;[212] and AT&T lobbied on 75 bills.[213] In addition to lobbying by individual firms, the telecoms lobbied on 186 bills through their industry group, the National Cable and Telecommunications Association.[214]

These organizations also lobby state and local governments. For example, AT&T and Verizon have promoted state legislation to restrict publicly funded broadband networks as discussed later in this report. Both operators have promoted their fiber networks while ending upgrades to large swaths of their legacy copper infrastructure, leaving millions of Americans with no fixed voice service, obliging them to pay more for voice and broadband based on LTE.[215]

Via lobbying, the telecom providers influence lawmakers to pass laws that maintain monopoly and duopoly conditions in the broadband market and the telecom market more broadly. As of January 2014, almost half of the states had passed legislation to ban or restrict municipal or state-led broadband infrastructure projects.[216] As discussed before, the creation and retention of monopoly and duopoly markets allow telecoms to charge relatively high prices for a relatively inferior product when compared to prices and bandwidth available in cities overseas.

[208] Open Secrets – Center for Responsive Politics: http://www.opensecrets.org/lobby/index.php (accessed January 2014).
[209] Open Secrets – Center for Responsive Politics: http://www.opensecrets.org/lobby/indus.php?id=B&year=2013 (accessed January 2014).
[210] Open Secrets – Center for Responsive Politics: http://www.opensecrets.org/lobby/top.php?indexType=s&showYear=2013 (accessed January 2014).
[211] Open Secrets – Center for Responsive Politics: http://www.opensecrets.org/lobby/clientbills.php?id=D000000461&year=2013 (accessed January 2014).
[212] Open Secrets – Center for Responsive Politics: http://www.opensecrets.org/lobby/clientbills.php?id=D000000079&year=2013 (accessed January 2014).
[213] Open Secrets – Center for Responsive Politics: http://www.opensecrets.org/lobby/clientbills.php?id=D000000076&year=2013 (accessed January 2014).
[214] Open Secrets – Center for Responsive Politics: http://www.opensecrets.org/lobby/clientbills.php?id=D000022131&year=2013 (accessed January 2014).
[215] "USA – Telecoms, IP Networks, Digital Media and Forecasts," Budde Comm, http://www.budde.com.au/Research/USA-Telecoms-IP-Networks-Digital-Media-and-Forecasts.html?r=51 (accessed January 2014).
[216] "USA – Fixed and Wireless Broadband Market – Insights Statistics and Forecasts," Budde Comm, http://www.budde.com.au/Research/USA-Fixed-and-Wireless-Broadband-Market-Insights-Statistics-and-Forecasts.html (accessed January 2014).

Existing Legislative Framework for Telecommunications Services

Both cable and DSL are classified as deregulated "information services" under the 1934 Communications Act. Therefore, providers are not subject to unbundling, nondiscrimination, and other common carrier requirements.[217]

The 1996 Telecom Act articulated a policy of preserving a "vibrant and competitive free market" for the internet. Since then, with a few exceptions, the federal government has ceded regulation of the internet to the commercial marketplace. State and local government, followed the federal lead and limited their regulation of the internet as well.[218]

Recent Legislation Promoted by Telecommunications Services Providers

As broadband morphed from luxury to necessity, however, some municipalities that were dissatisfied with their communities' broadband tried to improve available broadband options. Their strategies included asking telecoms in their community to collaborate on increasing bandwidth, building and operating community owned networks, and a range of intermediate strategies.

In many instances, telecom firms rebuffed municipal attempts to work together to improve bandwidth. Telecoms also opposed municipal efforts to build and operate municipally owned networks. One tactic is to broadcast negative, misleading advertisements to persuade the public that the provision of municipal broadband will decrease broadband availability and increase the cost of broadband. Usually, the opposite is true. A second tactic is to promote laws that prohibit municipally owned networks or make municipally owned networks more difficult to launch and more expensive to operate.

For example, the American Legislation Exchange Council (ALEC) creates "model legislation" on a host of issues. Many ALEC written laws serve as templates for legislators to modify and introduce in their state legislature. ALEC written laws often promote the transfer of public sector functions to the private sector or prohibit the public sector from performing functions currently performed by the private sector.

For example, ALEC has drafted legislation to privatize child support enforcement, foster care and adoption services, Medicare, Social Security, Welfare-to-Work programs, correctional facilities, education, laboratory testing, water and waste water management, and other public sector services.[219]

Other ALEC laws:

- Allow governors to appoint business leaders to find government for services to privatize
- Prohibit government from engaging in any activity that results in competition with the private sector, unless there is a compelling state interest
- Prohibit government from offering services that could be provided by the private sector
- Mandate that some public services be opened to bidding by private corporations[220]

In the municipal broadband realm, as of May 2014, 19 states had passed laws banning or restricting local communities from creating publicly owned alternatives to the dominant broadband provider.[221]

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[217] Anthony E. Varona, "Toward a Broadband Public Interest Standard," American University Washington College of Law, 2009, pg. 91.
[218] Anthony E. Varona, "Toward a Broadband Public Interest Standard," American University Washington College of Law, 2009, pg. 32.
[219] "The United States of ALEC: Privatization Fact Sheet," Common Cause – Holding Power Accountable, The United States of ALEC website: http://theunitedstatesofalec.org/ (accessed January 2014).
[220] "The United States of ALEC: Privatization Fact Sheet," Common Cause – Holding Power Accountable, The United States of ALEC website: http://theunitedstatesofalec.org/ (accessed January 2014).
[221] Tod Newcombe, "Comcast-Time Warner Merger Would Hurt Municipal Broadband," Governing, May 12, 2014, http://www.governing.com/topics/transportation-infrastructure/gov-comcast-time-warner-merger-concerns.html.

Typically, such legislation requires public broadband networks to quickly achieve profitability, a task that is difficult for a private entity due to high initial construction costs. Some laws also force municipalities to impute to themselves costs that private providers would pay, even if the municipality doesn't actually have to pay them. Imputed cost requirements increase municipal rates to the uncompetitive levels that private entities would charge if they were willing to provide the services at issue. Imputing costs is also difficult, time-consuming, inexact, and highly subjective. Therefore, imputed cost requirements provide opponents of public communications initiatives virtually unlimited opportunities to raise objections that significantly delay and add to the costs of such initiatives.[222]

One example is North Carolina HB 1587, the Local Government Fair Competition Act introduced in 2007. This bill listed financial and political requirements for governments to satisfy before getting into the broadband business.[223] Under the bill, a municipality interested in providing broadband:

- Would have to hold at least 2 public hearings and a special election
- Must include only revenues generated by the service in any bond funding plan—in other words, it could not put up any money to get the service started
- Cannot subsidize the service with any other revenue source
- Must calculate the cost of taxes and fees it does not pay into the fee it charges for the service, and must pay the equivalent of those taxes into the general fund each year
- Must keep separate books for and publish an annual independent audit of the internet service business
- Must turn a profit on the service within four years[224]

Detractors said that the bill required municipal broadband providers to adhere to stricter requirements than private sector telecoms. For example, ISPs require more than 4 years to earn profits. The North Carolina League of Municipalities and many cities opposed the measure, saying that it would make it impossible for municipalities to provide service in areas neglected by private industry. To detractors, rather than ensuring competition, the bill eliminated competition to the private sector.[225]

The Fiber to the Home (FTTH) Council, a non-profit group dedicated to promoting FTTP systems, voiced opposition to the bill in a letter to the North Carolina House of Representatives, which said, "…the legislature should be looking to accelerate and promote entry by all entities – private and public – into the deployment of next-generation networks. Specifically, you should be lowering barriers to entry by municipalities – and not raising them, as HB 1587 would do."[226] In 2011, the bill became law.[227]

Likewise, in Louisiana, the legislature passed the Louisiana Local Government Fair Competition Act (RS 45.844.41 to RS 45.844.56) which claims to protect private internet service providers from unfair competition from the public sector, like its North Carolina counterpart. More specifically, the legislation requires Louisiana's potential government telecom service providers to perform several tasks prior to "providing cable television, telecommunications, or advanced services." These include:

- Hold a preliminary public hearing

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[222] Jon Brodkin, "ISP lobby has already won limits on public broadband in 20 states," Ars Technica, http://arstechnica.com/tech-policy/2014/02/isp-lobby-has-already-won-limits-on-public-broadband-in-20-states/, February 12, 2014.
[223] Fiona Morgan, "Cities fight bill to limit broadband," *Indy Week*, June 6, 2007, http://www.indyweek.com/indyweek/cities-fight-bill-to-limit-broadband/Content?oid=1202258.
[224] Fiona Morgan, "Cities fight bill to limit broadband," *Indy Week*, June 6, 2007, http://www.indyweek.com/indyweek/cities-fight-bill-to-limit-broadband/Content?oid=1202258.
[225] Fiona Morgan, "Cities fight bill to limit broadband," *Indy Week*, June 6, 2007, http://www.indyweek.com/indyweek/cities-fight-bill-to-limit-broadband/Content?oid=1202258.
[226] FTTH Council letter to Joe Hackney, Speaker, North Carolina House of Representatives, June 14, 2007.
[227] "Municipal broadband contenders: Wilson, NC," *FierceTelecom*, April 10, 2013, http://www.fiercetelecom.com/special-reports/municipal-broadband-contenders-wilson-nc (accessed January 2014).

- Hire a consultant to conduct a feasibility study in accordance with RS 45.844.49; adopt the feasibility study by resolution
- Determine if annual revenues will exceed annual costs by the least amount necessary to meet bond obligations
- Hold another public hearing, if the project will be able to meet bond obligations
- Include within in its rates an amount equal to all taxes and fees applicable to a similarly situated private sector provider of the same services
- Maintain separate books for the telecom services[228][229]

The legislation also prohibits government providers from:

- Cross subsidizing services with tax dollars, income from other government or utility services, below market rate loans from the government
- Grant undue or unreasonable advantage to itself or any private service provider[230]

In Kansas, the proposed Senate Bill No. 304, the "Municipal Communications Network and Private Telecommunications Investment Safeguards Act," prevents municipalities from directly or indirectly:

- Providing to one or more subscribers, video, telecommunications or broadband service; or
- Purchasing, leasing, constructing, maintaining or operating any facility for the purpose of enabling a private business or entity to offer, provide, carry, or deliver video, telecommunications or broadband service to one or more subscribers.[231]

The exceptions to this rule are "unserved areas" which are "one or more contiguous census blocks within the legal boundaries of a municipality" where 9/10 of households don't have access to fixed broadband, mobile broadband, or satellite broadband at the "minimum transmission speed." Currently, the FCC defines the minimum acceptable transmission speed as a download speed of 3 mbps.[232] The definition of unserved does little to protect many people with no broadband access from the impact of this bill because it considers mobile and satellite to be viable broadband options, which they are not because neither can provide the affordable, reliable, high-bandwidth transmission of large amounts of data needed for a primary internet connection.

While Kansas City's arrangement with Google Fiber can continue, the law prevents other Kansas municipalities from pursuing such a partnership in addition to forbidding them from offering service to the public their own networks. As of February 2014, thanks to pressure from Kansas residents and business, sponsors had retracted this bill.

On an encouraging note, Georgia HB 282, the Municipal Broadband Investment Act, which limited the ability of public internet service providers to serve areas with existing broadband service,[233] failed to gather enough votes to become law.[234]

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[228] Public utilities and carriers – Louisiana State Legislature, http://www.legis.state.la.us/lss/lss.asp?folder=119 (accessed January 2014).
[229] La. Rev. Stat. Ann. § 45:884.41 et seq.; http://law.justia.com/codes/louisiana/2006/65/285530.html (accessed January 2014).
[230] Public utilities and carriers – Louisiana State Legislature, http://www.legis.state.la.us/lss/lss.asp?folder=119 (accessed January 2014).
[231] Kate Cox, "Kansas Legislature Wants to Stop Any Other Kansas Cities From Getting Google Fiber," *Consumerist*, January 30, 2014, http://consumerist.com/2014/01/30/kansas-legislature-wants-to-stop-any-other-kansas-cities-from-getting-google-fiber/ (accessed March 2014).
[232] Kate Cox, "Kansas Legislature Wants to Stop Any Other Kansas Cities From Getting Google Fiber," *Consumerist*, January 30, 2014, http://consumerist.com/2014/01/30/kansas-legislature-wants-to-stop-any-other-kansas-cities-from-getting-google-fiber/ (accessed March 2014).
[233] Georgia General Assembly: http://www.legis.ga.gov/legislation/en-US/display/20132014/HB/282 (accessed January 2014).
[234] "USA - Telecoms, IP Networks, Digital Media and Forecasts," Budde Comm, http://www.budde.com.au/Research/USA-Telecoms-IP-Networks-Digital-Media-and-Forecasts.html?r=51 (accessed January 2014).

The North Carolina, Kansas, and Louisiana legislation support ALEC's goal to limit public sector provision of services that the private sector also provides, in this case the provision of broadband. Clearly, ALEC written laws influence the broadband market across the country.

However, these laws contradict Section 253 of the 1996 Telecom Act, which proscribes state or local laws that may prohibit or have the effect of prohibiting the ability of any entity to provide telecommunications service. Sadly, the FCC has refused to enforce this prohibition against anti-competitive state and local laws that advantage cable and telephone companies.[235]

In addition to opposing municipal broadband networks right to exist and/or ability to operate, telecom lobbyists also fight laws to encourage better service, lower costs, and expanded access for more people. Telecommunications providers also try to ensure that federal laws and policies support their interests.

Federal Communications Commission (FCC) proposes to abandon its long-held net neutrality policy, which stipulates that content providers should not face discrimination in providing content to consumers and that content users should not face discrimination in accessing content.[236] The existing net neutrality policy ensures that small non-profits and poor individuals have the same ability to broadcast their message as the wealthiest plutocrat or corporation.

Under proposed rule changes, the FCC would allow content providers e.g.) Disney, Americans for Prosperity, Jane Doe III, etc., to pay ISPs for the ability to transmit their content to customers faster than other content providers who cannot or will not pay the extra fee. Because the internet is not legally considered to be a utility (and therefore subject to more stringent regulations because it is deemed necessary to live), ISPs are under no obligation to treat all customers equally.[237]

Under the proposal, broadband providers would have to disclose how they treat all internet traffic, on what terms they offer more rapid service, and whether in assigning faster service, they have favored their affiliated companies that provide content.[238]

Consumer groups claim that the changes will increase costs for consumers as content providers pass increased expenses to customers. These groups also claim the changes will hinder consumer access to new products offered by companies that cannot afford to pay extra to send their content over the internet equivalent of a toll lane.[239] Other possible impacts include the ISPs further reducing their rate of upgrading connections so that they can channel content providers to the paid prioritization plans.[240]

Municipalities with community owned networks are less likely to suffer from net neutrality rule changes. Community owned networks are less likely to engage in paid prioritization because it adds no value for its subscriber-owners, who are more interested in ensuring affordable broadband access than in obtaining profits. In fact, the more ISPs cheat subscribers, the more valuable community networks become by providing better service. Furthermore, if a community network engages in behavior that

[235] Anthony E. Varona, "Toward a Broadband Public Interest Standard," American University Washington College of Law, 2009, pg. 97.
[236] Edward Wyatt, "F.C.C., in a Shift, Back Fast Lanes for Web Traffic," New York Times, April 23, 2014, http://www.nytimes.com/2014/04/24/technology/fcc-new-net-neutrality-rules.html?hp&_r=1.
[237] Edward Wyatt, "F.C.C., in a Shift, Back Fast Lanes for Web Traffic," New York Times, April 23, 2014, http://www.nytimes.com/2014/04/24/technology/fcc-new-net-neutrality-rules.html?hp&_r=1.
[238] Edward Wyatt, "F.C.C., in a Shift, Back Fast Lanes for Web Traffic," New York Times, April 23, 2014, http://www.nytimes.com/2014/04/24/technology/fcc-new-net-neutrality-rules.html?hp&_r=1.
[239] Edward Wyatt, "F.C.C., in a Shift, Back Fast Lanes for Web Traffic," New York Times, April 23, 2014, http://www.nytimes.com/2014/04/24/technology/fcc-new-net-neutrality-rules.html?hp&_r=1.
[240] christopher, "Paid Prioritization Threat Reinforces Value of Community Networks," Community Broadband Networks, April 24, 2014, http://muninetworks.org/content/paid-prioritization-threat-reinforces-value-community-networks.

hurts subscribers, it is easier for subscribers to correct that behavior via elections or other means because the subscriber own the network, rather than shareholders scattered across the world.[241]

As demonstrated above, some legislators and policy makers in state and federal government continue to dedicate resources to creating and sustaining rules that promote the interests of ISPs rather than those of their subscribers.

Response to Recent Legislation Promoted by Telecommunications Services Providers

In February 2014, the Federal Communications Commission (FCC) announced that it would begin examining how state level barriers against municipal networks deter investment in networks communities need. Such state legislation directly contradicts America's Plan, which recommends that Congress make clear that tribal, state, regional, and local governments can build broadband networks. The FCC noted that even if communities choose not to build their own network, having that capacity incents the cable and telephone companies to provide better service and lower rates.[242]

Therefore, from the FCC's perspective, it is vital to preserve the ability of government entities to build their own networks. In April 2014 remarks to the National Cable & Telecommunications Association, FCC Chair, Tom Wheeler, said that state laws should not prohibit municipal governments pursuing community owned broadband systems. He indicated a willingness to use FCC power to preempt state laws that ban competition from community owned broadband networks.[243]

The FCC has promised to gather evidence on whether municipal networks can contribute to expanding high-speed internet access in communities.[244]

In response to petitions from surrounding areas, which have inadequate or no broadband service, in July 2014, the Electric Power Board of Chattanooga (EPB) has petitioned the FCC to preempt a Tennessee law prohibiting it from providing broadband service to areas outside its electric service territory.[245]

Likewise, in response to petitions from adjacent areas, in July 2014, Greenlight, a community owned cable, internet, and phone utility, has petitioned the FCC to preempt the North Carolina law prohibiting Greenlight from providing broadband internet services outside Wilson County.[246]

In addition to asking the FCC to preempt laws that limit a community owned network from serving many members of the community via geographic restrictions on service areas, community broadband advocates also promote legislation to support community owned networks as described below.

Federal Legislation Promoted by Broadband Public Interest Advocates

Unlike ALEC-written legislation to promote ISPs' interests, legislation to promote the public interest in the provision of telecom services often languishes after introduction. The Broadband Affordability Act of 2011 and the Community Broadband Act are examples of legislation to help improve broadband access among low income people that did not move beyond introduction in Congress.

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[241] christopher, "Paid Prioritization Threat Reinforces Value of Community Networks," Community Broadband Networks, April 24, 2014, http://muninetworks.org/content/paid-prioritization-threat-reinforces-value-community-networks.
[242] christopher, "FCC to Investigate Barriers to Community Networks," Community Broadband Networks, February 19, 2014, http://muninetworks.org/content/fcc-investigate-barriers-community-networks.
[243] Tom Wheeler (FCC Chair), Remarks at the National Cable & Telecommunications Association, April 30, 2014, http://www.fcc.gov/document/chairman-tom-wheeler-remarks-ncta.
[244] Christopher Mitchell and Lisa Gonzalez, Municipal Network Barrier ALERT, http://muninetworks.org/content/fcc-investigate-barriers-community-networks (accessed March 2014).
[245] "EPB Petitions FCC to Enable Local Broadband Choice," EPB Press Release, July 24, 2014, https://www.epb.net/news/news-archive/epb-petitions-fcc-to-enable-local-broadband-choice/.
[246] "Wilson Urges FCC Preemption of NC's State Law Barrier to Broadband," Greenlight Press Release, http://www.baller.com/pdfs/wilsonpressrelease.pdf (accessed July 30, 2014).

HR 2163 Broadband Affordability Act of 2011 – Requires the FCC to establish a broadband Lifeline program enabling qualifying urban and rural low-income customers to purchase broadband service at reduced charges by reimbursing providers for each customer such served. After introduction, the House referred the bill to the Subcommittee on Communications and Technology.[247] As of February 2014, the bill had not advanced further in the legislative process. Although the bill requiring a broadband Lifeline program did not pass, legislation to expand the existing telephone Lifeline program to encompass broadband, too, did pass.

HR 1685 – Broadband Adoption Act of 2013 - Amends the Communications Act of 1934 to direct the FCC to adopt a final rule establishing support for broadband under the Universal Service Fund Lifeline Assistance Program. The Act would allow qualifying, low-income Lifeline clients in urban and rural areas to pay reduced charges for basic telephone, voice telephony, or broadband services, whether purchased individually or in a bundle. This Act is now law.[248]

In furtherance of HR 1685, the Wireline Competition Bureau, launched 14 pilot projects in 21 states and Puerto Rico to provide wireline or wireless broadband service to eligible low-income consumers. Enrollment in the Lifeline Broadband Pilot Program occurred February to November 2013. The projects differ in subsidy amount, end-user charges, equipment type, speed ranges, data usage limits, and access to digital literacy training. Low-income consumers who already subscribe to home broadband or a mobile hotspot are ineligible. The FCC plans to use insight from this project to restructure the Lifeline program to increase broadband adoption among low-income Americans.[249]

S 1853 Community Broadband Act – Promotes affordable broadband by allowing municipal governments to provide telecommunications capability and services. Its provisions

- Prevent state governments from enforcing or adopting laws to prohibit municipalities from providing broadband services
- Encourage the use of public-private partnerships to promote broadband services
- Initiate notice requirements about broadband deployment to ensure the public has adequate information available to evaluate options
- Give private providers the opportunity to provide alternative broadband services
- Ensure public and private broadband providers are treated equally with respect to laws, guidelines, and policies that apply to all providers of broadband services[250]

This legislation, introduced in the 2007-2008 110th Congress, has languished since that time.[251]

H Res 81 – Supports the designation of March 21 as National Digital Literacy Day and reaffirms the need to promote digital literacy and broadband access and adoption in the United States. This legislation, which does not require specific actions or spending money, passed the House, but not the Senate.[252] House Resolution 81's failure to pass the full Congress demonstrates that even the most innocuous legislation to improve broadband access in the United States faces challenges to becoming law.

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[247] Congress.gov: http://beta.congress.gov/bill/112th-congress/house-bill/2163?q=%7B%22search%22%3A%5B%22broadband%22%5D%7D (accessed January 2014).
[248] Congress.gov: http://beta.congress.gov/bill/113th-congress/house-bill/1685?q=%7B%22search%22%3A%5B%22broadband%22%5D%7D (accessed January 2014).
[249] Federal Communications Commission website: http://www.fcc.gov/encyclopedia/low-income-broadband-pilot-program (accessed February 2014).
[250] Wikipedia: http://en.wikipedia.org/wiki/Community_Broadband_Bill (accessed February 2014).
[251] Congress.gov: http://beta.congress.gov/bill/110th-congress/senate-bill/1853?q=%7B%22search%22%3A%5B%22S+1853%22%5D%7D (accessed February 2014).
[252] Congress.gov: http://beta.congress.gov/bill/113th-congress/house-resolution/81?q=%7B%22search%22%3A%5B%22broadband%22%5D%7D (accessed January 2014).

State Legislation Promoted by Broadband Public Interest Advocates

In addition to the federal legislation discussed above, broadband supporters in some states have introduced state legislation to enable local communities to develop community networks. For example, even though Tennessee has several publicly owned broadband networks, state statutes discourage investment in community owned networks. As of spring 2014, people were beginning to introduce legislation to change the state's broadband regulatory environment.

For example, Tennessee SB 2005 and HB 1974 would expand the municipal electric system's provision of broadband service in Clarksville, the state's fifth largest city, to serve schools, hospitals, and industrial parks. Under current rules, municipal electric systems that provide broadband cannot expand beyond their electric service territory. Other bills would allow electric cooperatives to use existing dark fiber to reach customers not served by rural telephone cooperatives.[253]

Possible "Capture" of Local, State, and National Politicians

The different trajectories of legislation favoring internet service providers and legislation protecting the public interest provide evidence that some officials may be overly eager to accommodate the desires of internet service providers. This situation may compound the market failures described previously. Some officials may not understand the negative impact on the public good and the ability of government to protect the public good of some legislation proposed by ISPs.

Clearly, some legislation proposed by telecoms reinforces existing failure in the telecom market, in part by preventing government from serving people and locations not served by internet service providers. Some people consider such private sector obstruction of government efforts to serve the public interest as an example of regulatory or agency capture.

Regulatory capture is a form of political corruption that occurs when a regulatory agency, created to act in the public interest, instead advances the commercial or special concerns of interest groups that dominate the industry or sector it regulates. Regulatory capture is a form of government failure; it allows firms to behave in ways injurious to the public.[254] "Captured" government entities are not limited to executive branch regulatory agencies; it is possible to capture judicial and legislative bodies as well.

One can debate whether the telecommunications industry has "captured" lawmakers. If some lawmakers have been captured, communities should prepare for stiff challenges to any broadband measure that ISPs perceive as not in their best interest.

Poor Corporate Citizens

Finally, many of the incumbent ISPs are poor corporate citizens of the communities they claim to serve. For example, Comcast, one of United States' largest telecoms and the spender of the most dollars lobbying Congress in 2013 does not support Philadelphia, the home of its corporate headquarters and the nation's fourth largest cable market, as much as it could. According to the Media Mobilizing Project, Comcast's income tax rate is 1/3 the rate paid by other firms with headquarters in Philadelphia and the firm pays virtually no property taxes. In the meantime, Comcast is scheduled to receive a multi-million dollar incentive to build a new headquarters building in the city while its Internet Essentials program, ostensibly developed to help low income people access the internet, serves only 9% of Philadelphia households eligible for the program.[255]

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[253] lgonzalez, "Tennessee Legislature Consider Four Pro-Muni Bills," Community Broadband Networks, March 24, 2014, http://www.muninetworks.org/content/tennessee-legislature-considers-four-pro-muni-bills.

[254] Wikipedia: http://en.wikipedia.org/wiki/Regulatory_capture (accessed January 2014).

[255] "Using the Franchise to Organize Against Comcast," Community Broadband Bits– Episode 124, Interview with Hannah Jane Sassaman, November 11, 2014, http://muninetworks.org/content/using-franchise-organize-against-comcast-community-broadband-bits-episode-124.

In another example of poor corporate citizenship, as of November 2014, anticipating a proposed merger with Time Warner, Comcast seeks to withdraw from certain markets, like Detroit, so that they will serve less than 30% of households. This action would allow the combined firm to avoid being classified as a monopoly and would allow it to continue serving more profitable markets like New York City.[256]

Summary

The preceding section highlighted numerous factors contributing to the supply of affordable broadband. The evidence presented above demonstrates various methods that telecommunications firms use to shape the telecommunications market in ways favorable to their needs and detrimental to consumers.

Indeed both the Federal Communications Commission and the D.C. Circuit Court in the Verizon v. FCC decision judged that, "absent such rules such as those set forth in the Open Internet Order, broadband providers represent a threat to internet openness and could act in ways that would ultimately inhibit the speed and extent of future broadband deployment."[257] While the FCC and the D.C. Circuit directed their statement toward net neutrality specifically, the evidence suggests that broadband providers' actions in other areas also threaten the spread of broadband and consumer access to broadband.

The antidote to market failure, regulatory capture, and other factors that allow ISPs to limit broadband access is grassroots action. Broadband public interest advocates must educate the public and local, state, and federal officials on the importance of affordable broadband, the harmful impacts of legislation to hinder public involvement in telecom services, and the potential benefits of legislation that promotes competition or otherwise improves the price, reliability, and bandwidth of broadband options.

Several case studies in the report, "Broadband Around the World," discuss how broadband advocates in other cities defeat legislation limiting public involvement in broadband as part of efforts to improve broadband in their communities.

Demand Side Contributing Factors

In addition to secondary factors that contribute to inequities in broadband supply, there also are ancillary factors underlying unequal demand for broadband services.

Lack of general and digital literacy skills

Some individuals lack the general and/or digital literacy skills to use the internet. For younger people, this may be due to their school system's failure to teach these skills. Perhaps, the school systems could not afford to hire instructors or buy the necessary equipment.

For many older people, learning digital literacy during primary and secondary school was not possible because the technology did not exist when they attended school. Therefore, if they did not acquire digital literacy skills as an adult at work, they may not have had a chance to acquire them.

For such individuals, inability to use computers, discomfort with the internet, or difficulty with written language can discourage them from attempting to use broadband. Some of these people see no benefit in paying for product or service they do not know how to use. Therefore, they may be less likely to subscribe to broadband, especially if no one else in their household seeks access to broadband.

Fear of cyber danger

[256] "Using the Franchise to Organize Against Comcast," Community Broadband Bits– Episode 124, Interview with Hannah Jane Sassaman, November 11, 2014, http://muninetworks.org/content/using-franchise-organize-against-comcast-community-broadband-bits-episode-124.
[257] Tom Wheeler (FCC Chair), Remarks at the National Cable & Telecommunications Association, April 30, 2014, http://www.fcc.gov/document/chairman-tom-wheeler-remarks-ncta.

Some people with basic computer and internet skills may feel uncomfortable managing the risks of using internet-enabled computers. These risks include possible infection of the computer by viruses and malware and user exposure to objectionable content, cyber bullies, and predators. People with a strong fear of these risks may opt not to subscribe to and use home broadband.

Lack of affordability

Likewise, some people do not subscribe to broadband because they cannot afford to buy a computer or wireless device to use to access the internet, even if they could afford the monthly subscription fees. In other instances, people own the necessary equipment yet cannot afford the monthly fees. Some people can afford neither the equipment nor the monthly fees.

Lack of understanding of the benefits of broadband

Some people may not subscribe to broadband because they do not see the benefit of using the internet to perform various tasks. In their opinions, the pre-internet methods of completing tasks will suffice.

In these instances, the people who create and promote internet content have failed to provide useful and relevant content to these potential users. Useful and relevant content:

- Pertains to a topic of interest for the user
- Is written in a language the user understands
- Is written at a grade-level appropriate for users' literacy skills

Furthermore, even when website owners create relevant content, they may fail to explain to non-users why their website and the internet in general are relevant to those individuals. The key to explaining the relevance of broadband and the internet to non-users may be to stop characterizing internet use as a job skill and to start portraying it as a life skill.

As the preceding discussion demonstrates, many individual and systemic factors interact in complex ways to impact broadband supply and subscription. The solutions to the digital divide problem will have to address these issues simultaneously.

Need for Government Action

Prior sections of this document discussed:

- Broadband's importance in acquiring knowledge and resources to earn money to pay for necessities like food, clothing, and shelter
- The personal and professional ramifications of inadequate broadband access
- Differential broadband access rates of lower income people and racial and ethnic minorities (who are more likely to be lower income than whites)
- Supply side and demand side factors that contribute to differential broadband adoption rates

To date, private sector telecommunications providers have not piqued interest in broadband for many low income people or made the product affordable to them. Furthermore, the lightly regulated US broadband market fails to provide adequate bandwidth to US broadband subscribers; bandwidth in most US communities lags bandwidth in European and Asian peer cities.

Due to the importance of broadband to individuals and communities, many people view access to quality telecommunications services as a right. Legislatures and courts in countries as varied as Finland, Greece, and Costa Rica have passed laws and issued rulings declaring a human right to internet and telecommunications networks and services.[258]

Because telecoms seem unwilling or unable to increase bandwidth and improve affordability, there is a growing consensus that the public sector needs to become more involved in the broadband market. For example, Greece declared that the state has an obligation to facilitate the production, exchange, diffusion, and access to electronically transmitted information.[259] Many nations, including the United States, have created national broadband plans to guide broadband deployment and expansion.[260]

The National Broadband Plan of the United States, America's Plan:

- Describes the problem – inadequate broadband access for many Americans
- Outlines why individual Americans and the nation need improved broadband access
- Sets overarching goals like "affordable access to robust broadband service and the means and skills to subscribe if they so choose"
- Provides bandwidth targets for public institutions (1 gbps both directions) by 2020
- Provides bandwidth targets for the 100 million households that represent 85% of the public (100 mbps download /50 mbps upload) by 2020
- Sets a 90% broadband adoption goal by 2020
- Suggests action to improve broadband access for people without such access.[261][262][263]

Despite the existence of America's Plan, broadband access for US residents lags access for residents in other nations due to many factors, including but not limited to:

- Inadequate funding to build infrastructure to areas without broadband networks
- ISPs' inability to upgrade or expand networks to meet customer needs or serve more customers

[258] Wikipedia: http://en.wikipedia.org/wiki/Internet_access (accessed March 2014).
[259] Constitution of Greece as revised by parliamentary resolution of May 27, 2008 of the VIIIth Revisionary Parliament, pg. 23 in the English translation.
[260] Wikipedia: http://en.wikipedia.org/wiki/National_broadband_plans_from_around_the_world (accessed June 2013).
[261] "Planning and Broadband: Infrastructure, Policy, and Sustainability," American Planning Association PAS Report 569, July 2012, pg. 28.
[262] "America's Plan (National Broadband Plan)," Executive Summary, pg. XIV, http://www.broadband.gov/.
[263] "The Iowa Broadband Landscape," Connect Iowa PowerPoint presentation, April 9, 2013, slide 7.

In its Seventh Broadband Progress Report, an annual review of broadband availability in the United States, the Federal Communications Commission (FCC) concluded that broadband is not being deployed in a reasonable and timely fashion as required by law and is therefore not available to all Americans.[264] The FCC also stated that availability encompasses more than physical deployment of networks and should encompass factors like cost, quality, and adoption by users.[265] The FCC identified several barriers to true broadband access such as:

- Costs and delays completing networks
- Broadband service quality
- Lack of affordable broadband access services
- Lack of access to computers and other broadband-capable equipment
- Lack of relevance of broadband for some consumers
- Poor digital literacy
- Other reasons, such as consumers' lack of trust in broadband and internet content and services, including concerns about inadequate privacy protections."[266]

The federal government's acknowledgement of the importance of universal broadband access and the challenges to providing universal access offer an impetus for individual communities to develop strategies to address this issue. Efforts by municipal governments to address differences in broadband access and/or increase bandwidth of available options support federal goals and should be encouraged.

[264] "Eighth Broadband Progress Report," Federal Communications Commission, released August 21, 2012, pg. 3.
[265] "Eighth Broadband Progress Report," Federal Communications Commission, released August 21, 2012, pg. 9.
[266] "Eighth Broadband Progress Report," Federal Communications Commission, released August 21, 2012, pg. 62-63.

Challenges to Government Action

In the United States, efforts by federal, state, and local governments to become more involved in planning for broadband face significant challenges as discussed below.

First, improving broadband access will require overcoming many technical challenges. The nature of some challenges is not readily apparent. For communities that choose to build and/or operate their own network, designing, building, operating, and maintaining a broadband network requires knowledge of available broadband technology, topography, soil conditions, the level of urbanization in the target area, and a host of other technical considerations.

Overcoming these challenges is imperative for both private and public sector broadband providers. If the public sector hires staff with the right expertise, government entities may not be disadvantaged compared to the private sector in running a community network or becoming more actively involved in working with incumbent ISPs to improve broadband in their communities.

Another challenge to public sector involvement in planning for broadband is securing money to perform planning, design, construction, operations, and maintenance. Both private and public sector organizations face this challenge. Depending upon the size of the network and the amount of money needed, the public sector may not face much more difficultly securing money than private sector.

Third, the human tendency toward inertia often results in maintenance of the status quo. Given the telecoms' resistance to change because they benefit from the current situation, improving a community's broadband will require a conscientious and concerted effort by people inside and outside government. Although busy, some people must allocate time to the effort to improve broadband in individual communities and ultimately throughout the United States.

Overcoming the inertia that maintains the status quo also requires political will from elected officials. They must avoid succumbing to pressure to make decisions against the public interest. Politicians will have to resist philosophical arguments that government should not involve itself in broadband planning and/or provision. Opponents of government involvement promote the free market as the solution to the problems plaguing broadband access in communities, ignoring the fact that the free market has not provided US communities with adequate and affordable bandwidth thus far.

Opponents of government involvement in broadband also claim that government lacks the technical and management expertise to address problems in broadband provision. While broadband delivery is a complex issue requiring the interaction of technical, regulatory, financial, political, socio-economic, philosophical, educational, and other factors, this complexity is not a valid reason to exclude government from involvement in broadband planning. To the contrary, government needs to apply its holistic, long-term perspective to efforts to remedy the current undesirable situation of too expensive and inadequate broadband.

Defeating resistance to public sector engagement with the nation's broadband inadequacies will require vigilance from broadband evangelists. These people must educate neighbors and elected officials about the importance of broadband and the implications of failing to address inadequate broadband locally and nationwide before the United States and its residents fall further behind other nations.

Already, government, non-profits, and private citizens have begun to demonstrate the possible benefits of greater government involvement in broadband planning and that fact that many Americans support the possibility of government taking a larger role in broadband planning. For example, a study conducted by the US Government Accountability Office (GAO) that compared 14 communities with

government-funded broadband projects to 14 communities that haven't received government funding for broadband projects found:

- 6 of 14 communities with government-funded broadband projects had download speeds of more than 51 Mbps; only 3 of the 14 communities without government funded broadband projects had download speeds greater than 51 Mbps
- 12 of 14 communities with government-funded broadband projects had download speeds of 26 Mbps or greater; only 9 of the 14 communities without government funded broadband had download speeds of 26 Mbps or greater.[267]

Furthermore, the government-funded broadband services charged about $11 less per month for 4-to-6 Mbps service than providers in the same communities that didn't receive government funding, and about $20 less per month than providers in communities without federally funded projects. The price differences were greater for higher speeds of broadband service.[268]

The GAO report provides evidence that government supported broadband results in tangible benefits – increases in bandwidth and decreases in price.

To counter the efforts of municipal broadband detractors, municipal broadband supporters are becoming more vocal in their espousal of public sector involvement in broadband planning and operations.

In June 2014, the American Public Power Association passed a resolution supporting the doctrine that states should not prevent local governments (including public power utilities) from investing in telecommunications infrastructure.[269] Likewise, the US Conference of Mayors passed a resolution to encourage the FCC to preempt state laws that create barriers to municipal broadband provision.[270] In addition, a group of Senators and House Representatives sent a letter to the FCC asking the agency to restore the ability to invest in broadband infrastructure to local communities. The letter stated, "…local communities should have the opportunity to decide for themselves how to invest in their own infrastructure, including the options of working with willing incumbent carriers, creating incentives for private sector development, entering into creative public-private partnerships, or even building their own networks, if necessary or appropriate."[271]

[267] Grant Gross, "GAO: Government-funded broadband means better service, lower prices," PCWorld, http://www.pcworld.com/article/2106540/gao-govt-funded-broadband-benefits-small-businesses.html, March 10, 2014.
[268] Grant Gross, "GAO: Government-funded broadband means better service, lower prices," PCWorld, http://www.pcworld.com/article/2106540/gao-govt-funded-broadband-benefits-small-businesses.html, March 10, 2014.
[269] lgonzalez, "APPA Adopts Policy Resolution Supporting Municipal Broadband Service," Community Broadband Networks, June 23, 2014, http://muninetworks.org/content/appa-adopts-policy-resolution-supporting-municipal-broadband-services.
[270] lgonzalez, "U.S. Conference of Mayors Passes Resolution to End State Barriers," Community Broadband Networks, June 27, 2014, http://muninetworks.org/content/us-conference-mayors-passes-resolution-end-state-barriers.
[271] US Senator Edward Markey et al, Letter to Tom Wheeler, FCC Chairman, June 27, 2014, http://muninetworks.org/sites/www.muninetworks.org/files/2014-06-letter-to-wheeler-supporting-local-authority.pdf.

Conclusion

It is within this context of growing recognition in the United States and abroad of the need for access to affordable, high-speed broadband along with a better understanding of the factors hindering its availability that the City of New Orleans conceived the idea of addressing its broadband deficiencies.

In New Orleans, as in other urban locations in the United States, broadband internet is physically available. Therefore, the main challenge is to improve the quality and pricing of available broadband options and the digital literacy of certain community members so they can use broadband.

The City has many options to address the dearth of affordable, high quality broadband, some of which the report, "Broadband Around the World," describes via summaries of how other municipalities addressed inadequate broadband in their communities.

In addition to the range of options described therein, the City could pursue the always available "do-nothing" option. While opponents of a particular course of action often focus on the hazards of that action, it is important to realize that preserving the status quo also poses risks.

For the City, the do-nothing option likely would result in a future in which:

- Low income residents continue to lag their wealthier neighbors in broadband use and digital literacy, making it harder for them to achieve professional and personal goals.
- Telecoms offers New Orleans subpar service for high prices compared to that available in other cities making it more difficult for residents, businesses, and City government to achieve personal, professional, and/or organizational goals.

A lack of affordable, high-speed broadband could hinder the City's ability to pursue economic development, equity, sustainability, and resilience goals. Therefore, maintaining the current situation may be more risky in the long-term than pursuing strategies to address its broadband deficiency.

Consequently, project staff recommended the City develop a Broadband Master Plan with clear goals and objectives for the broadband bandwidth and affordability as well as strategies to implement those goals and objectives. Project staff also recommended that the implementation strategies be tailored to the unique circumstances of the New Orleans market and the realities of Louisiana law.